

STUDY ASSOCIATION

G E W I S



SUPREMUM

VOL 53 N° 2

THE
FIRE
EDITION

EDITORIAL



When we think of fire, should we fear it? Of course, it is destructing. I mean, try holding a flame next to an old Supremum (or not, and enjoy the collection of beautiful magazines forever.) However, flames also bring back lots of memories. I have often had a good time sitting or standing around a campfire with friends or family.

EDITOR IN CHIEF Anne Nijsten

A campfire is also a place to meet new people and hear their stories. Many years ago, during a vacation in the Czech Republic, I was invited by the owners of the camping where I was staying to celebrate some kind of witch burning. Luckily, this turned out to be a straw man on the bonfire, and everyone was enjoying sausages which were roasted in the flames on sticks.

Now, after another year of the Supremum team being on fire, the final edition has landed on the doormats. Here you will also find a lot of stories from the people at GEWIS, so enjoy those, while enjoying the summer break. Hopefully we will meet again, possibly at one of the FLUP or B.O.O.M. campfires.

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Area residents of Eindhoven, a small town in the Netherlands, were astounded when a large, unknown object suddenly fell from

shrouded in mystery, to liken it to any beer



CHAIRMAN'S NOTE

DON'T LOSE YOUR FIRE

Fire, what comes to mind when the word fire is mentioned? The word fire carries a lot more emotion than the previous two themes of this year's Suprema, Wind and Earth. Fire means danger, but also drive, science, light and so much more. The first thing that popped into my head when I thought about fire was the Formula 1 crash of last year. One of the drivers hit the barrier and his car became a huge ball of fire. A clear example in which fire can be extremely dangerous. However, thinking about fire also brings happy memories, like the campfires during holidays, fireworks and science classes in high school.

TEXT Irne Verwijst

As the word 'Fire' can be used in several ways and it can mean a lot of different things, I want to dive deeper into one interesting quote: 'Don't lose your fire'. Fire in this context means your spirit, ambition or motivation. However, in ever changing times, it might be very hard to keep your spirits high and be motivated. Personally, I get motivated a lot by working with other people. In my opinion, being able to discuss problems together solves them better. Although it might not always be possible to always have your factors of motivation around, there are ways to intrinsically motivate yourself. Let's go over a few points of attention that might help.

Disclaimer: I am not a specialist, but this has been working for me.

FIND SUBJECTS/PROJECTS THAT SPARK YOUR CURIOSITY

If you are curious about something, the challenge ahead might not feel as heavy as it is. This might not always be easy as some courses at the university are mandatory. However, there are always different themes and assignments within a course.

TAKE CONTROL OF THE SITUATION

When you are in control, you can make the right decision when necessary. Also, you are invested in the subject, meaning you feel responsible. This responsibility helps to keep you interested.

CLARIFY YOUR TASKS

Having a TODO list is great, but sometimes it seems too long to get started. For me, making my TODO list means I have to write clear statements of my tasks and prioritize them in such a way that I know what the most important tasks are at that time.

MEET WITH INVOLVED PEOPLE IN ANY WAY YOU CAN

Meeting up can be done in real life, but also online. A phone call can already make a difference sometimes. As I wrote before, conversations help me to stay motivated. Also, having someone around who is working hard, might push you to do the same.

EDUCATION FIRST

EVALUATING EVALUATIONS

H ave you ever filled in an evaluation questionnaire after following a course? Big chance you have, because the response rates in our department are quite high. Maybe you weren't fully satisfied with the quality of a course, maybe you got tired of all the reminders that you get, or maybe you just like giving feedback! But have you ever evaluated the evaluations? When taking a closer look, there are, certainly, things that can be improved...

TEXT Koen de Nooij

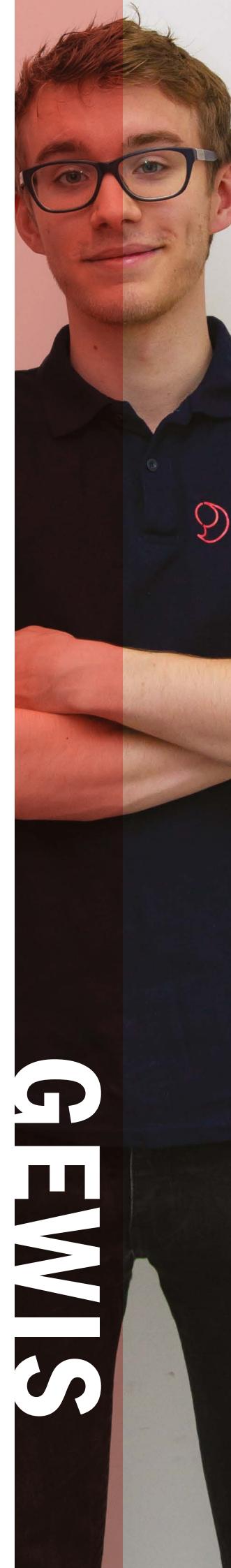
To get a good picture of the evaluation process, it's good to give some background first. As you might know, the university currently has a system in place called EvaSys. After you follow your course, you get an email asking you to fill in the evaluation. When you do, your feedback is collected, processed, and presented in a clear report. This report then gets evaluated by the teacher and the relevant program committee. The teacher writes a reflection on the course and might present points of improvement. It's up to the program director and program committee to double-check that the improvements get implemented next year. The feedback from students is taken seriously, and overall, the process works quite well. But something is missing: students have little to no idea what happens after they fill in a questionnaire.

This brings us to the concept of a feedback loop. If you want something to work as best as possible, it's essential to let stakeholders evaluate it. Letting stakeholders know what was done with their feedback, thus closing the feedback loop, makes them feel heard and motivates them to participate in such an evaluation next time. Courses are no different, and if you aim to get higher student satisfaction and response rates, closing the feedback loop is an important thing to consider.

The evaluation results might have another use as well, namely helping students make an educated choice among their elective courses. Currently, you rely on friends or fellow students to give their anecdotal experiences with a course. It's easy to see how this may have a negative impact on your choice. Combined with closing the feedback loop, we come to two use cases requiring more transparency in the feedback process: retrospective and prospective insight. But what should be shared? And where do you share it?

“ If you want something to work as best as possible, it's essential to let stakeholders evaluate it. ”

To answer those questions, I've talked to a number of staff members from the department and university and sent out a survey to students within the department receiving a lot of responses. This gave a pretty good view of what students are looking for in both cases and the arguments to consider. First of all, it's clear that responses should remain anonymous. This way, the questionnaires are a safe space to give feedback without having to be afraid of negative consequences. It's also wise not to share the responses to open



questions directly, but a summary or conclusion drawn from them is a possibility. The results of the closed questions are another discussion though. Together, they contribute to seven categories on which a course is evaluated: level, setup, organization, material, workload, assessment, and overall grade. But is it beneficial to share the exact ratings of a course? One might argue that they are useful in the prospective case since they make it easy to compare courses. However, these numbers are simply a proxy for the overall quality of the course. The underlying reasons for deviations are not immediately clear, and therefore they may lead to the wrong conclusions. Next to that, they could influence the choice of students in a

negative way since choosing the “easy” elective becomes much more straightforward. Other elements that could be shared are a reflection on the course and proposed improvements by the teacher. For the prospective case, students might additionally be interested in a side-by-side comparison of possible electives in a quartile and in testimonials of other students that have already followed a course.

In the survey I sent out to students, I asked if they were interested in these elements for the retrospective and the prospective case, giving the following results. Finding a good place to share the results is also important. Currently, evaluations results are sometimes

| Element | Interested (Retrospective) | Interested (Prospective) |
|---|----------------------------|--------------------------|
| A reflection on the course by the teacher | 90% | 78% |
| Points of improvement | 85% | 75% |
| Exact ratings of the course | 65% | 68% |
| Comparison of electives in a quartile | - | 55% |
| Testimonials from other students | - | 45% |

shared in the kick-off meetings, but not all students attend these. Furthermore, you don't have the results readily available when you take the time to choose your electives. An alternative would be to put them online, accessible at all times. In the survey, more than 95% of students were a proponent of this for both the retrospective and prospective case. And would all of this help to increase the response rates? I think it would! More than 90% of the students indicated that they would be more motivated to fill in future evaluations when these insights become available.

Looking forward, a lot of things are going to change. In quartile 4, a small pilot for sharing results retrospectively in the kick-offs will run within our department. The lessons learned there will be applied next year. Furthermore, the entire university is getting a new evaluation system with a lot of improvements over EvaSys in the coming years! Keep an eye out for these changes and remember to fill in the questionnaires. You might not see their immediate effects yet, but they are incredibly useful for maintaining the quality of education.

If you want to share your thoughts on the topic or any other matters related to education, feel free to send me an email at co@gewis.nl!

EDUCATION FIRST

A NEW CHALLENGER APPEARS!

For many students, the change in BSA requirements has come as a happy surprise. With most of the courses being online, it's fair to say that many have had the need to adjust and such a change might take away extra stress. Contrary to what you might think, some early indications show that students are actually performing just as well, and in some cases even better, compared to previous years. Well done! For now, I want to leave our current challenges as they are and bring attention to the winds of change that we as a department set sail on. We're taking a closer look at the TU/e Strategy 2030 and in particular, a concept called Challenge-Based Learning.

TEXT Koen de Nooij

WHAT IS CHALLENGE-BASED LEARNING?

For many, the term challenge-based learning, or CBL in short, seems unfamiliar. For others, it sounds like the latest buzz-word used to describe anything new about the courses we follow. In all fairness, it's quite hard to give a concise definition for CBL, but it is used to describe forms of education that are based on challenges. These challenges are focused on applying the things you've learned within a course, often in a group setting. To give some examples, within Computer Science you can look at the DBL projects, for Applied Mathematics at the modeling components within probability courses, and of course Engineering Design is a good example as well. Even a course with a flip-the-classroom approach can be classified as CBL. The goal of this form of education is to give you, the student, the freedom to choose your own learning paths by setting your own challenges. This could improve your motivation, forces you to think about what you want to achieve in your study program, and gives you invaluable soft skills ready to be used in the real world!

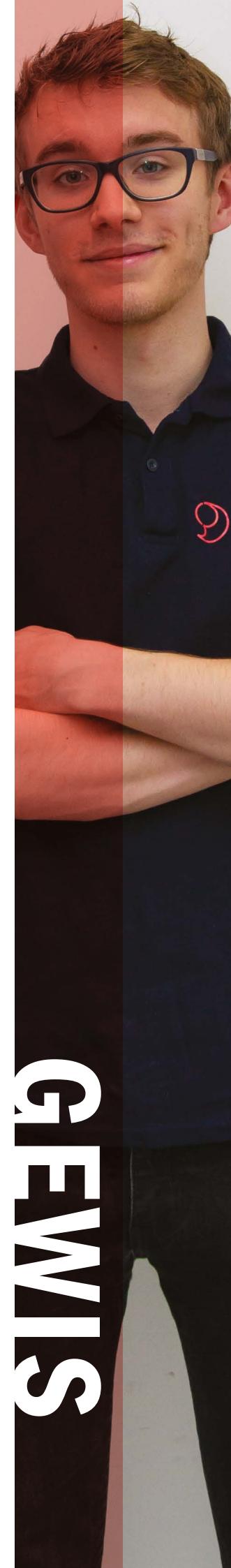
Only one question remains: why aren't we using this for all courses already!?

CURRENT SITUATION

To answer that question, we should first look at the current situation of CBL. Our university has set up a large project overseeing the implementation of CBL in study programs. The general goal is to make 30% of the current courses follow a challenge-based approach by 2030. This might seem simple, but in reality it requires restructuring of complete programs, a lot of administrative work, and possibly employing many more staff members. The central project has split up the next ten years into two phases: the coming five years will be used to research and pilot different implementations of CBL in courses to see what works best. From the conclusions drawn in this phase, the next five years are for departments to implement CBL in their study programs in the best way possible.

DISCUSSION

As you might see, we're not completely there yet. Furthermore, some people have concerns about the practical side of challenged-based learning. To get insight into important aspects of CBL, I've talked with some staff members and students studying Mathematics and Computer Science about the following subjects.



STUDENT GUIDANCE AND COACHING

An important part of a complete implementation within a department also includes setting up an intensive coaching structure for students. In an ideal scenario, students would indicate their areas of interest and would be assigned a teacher mentor within that area. With their help, students orientate themselves and further develop within an area by choosing their challenges accordingly. The students I talked to seemed quite positive about such a program and indicated that they would gladly take part. However, looking at the practical side of such a program, some problems might arise. Since the coaching is quite intensive, only a few students can be assigned to a teacher mentor, requiring a large amount of coaching staff. On top of that, currently employed staff members aren't necessarily trained to take on such a coaching role. Properly setting up such a program and supporting it will likely take up a large part of the department budget.

A FIT FOR OUR DEPARTMENT?

We've probably all noticed that every department differs quite drastically in identity and culture. A question I had was whether the increased responsibility and the larger focus on soft skills would fit Mathematics and Computer Science students.

The students I spoke with said that whether CBL would fit their study program would depend on the implementation. They definitely believe that students can adapt to the changes with proper guidance from academic advisors and teacher mentors. Furthermore, they think some courses lend themselves better for a challenge-based approach than others. Students agreed that courses later in the program and within a more applied field would be a better fit (e.g. Data Mining or Numerical Analysis as opposed to Data Structures or Calculus).

ASSESSMENT

A fairly unanswered question is what the best way of assessment is in these challenge-based courses. For

group projects, students said that they sometimes experience frustration due to free-loading students. They indicate that some of the current assessment models fall short in these cases and don't reflect individual efforts well enough. However, they did point to the course Engineering Design as an example, with weekly mandatory updates that each student has to provide, resulting in a better assessment. It's also important to keep in mind that, since the implementations of CBL can vary quite a bit, we can't expect to find a one-size-fits-all model of assessment. We hopefully get a good idea of the strengths and weaknesses, from the pilots in the coming years.

QUALITY OF EDUCATION

The effect on the quality of education is also something to keep an eye on. Ideally, the implementation of CBL would improve the overall quality of a study program. Preparing students for the industry by strengthening their teamwork and communication skills. It turns out that companies very much value problem-solving capabilities and challenge-based learning would be *the* way to develop these! However, choosing your own learning paths does give you a lot of freedom. The students I talked to think that without proper checks, courses won't be able to guarantee that all learning goals are achieved. Having an exam about the theory next to a project might be a simple solution to this problem.

CONCLUSION

The conclusion I draw is that challenge-based learning is a welcomed change among the people I talked to. The experience they've had with these forms was relatively positive and they were confident that with good research the coming years, the implementations can only improve. The extra coaching seemed like an exciting opportunity as well. I'm personally looking forward to what the future will bring and I'm sure that we'll sail along just fine!

If you want to tell me what you think about these topics or anything else related to education, I'm happy to listen. Just send me an email at co@gewis.nl!

SUSTAINABILITY AND ANALYTICS

“A sustainable future is attainable, but only if we continue to tackle these issues head-on, hold ourselves accountable, and work together to enable new science- and technology-based solutions that directly address both climate change and plastic waste.” - Jim Fitterling, Chairman & CEO Dow Chemical Company

TEXT Peter Catry & May Roca (Data Services group in Dow)

Developments in analytics and artificial intelligence are transforming chemical manufacturing as part of Industry 4.0 initiatives, which is the ongoing automation of traditional manufacturing and industrial practices by using modern smart technology. Smart technologies increase productivity, quality and positively impact the sustainability of manufacturing organizations. However, targeted application of IIoT (industrial internet of things) and artificial intelligence towards companies' sustainability goals are not yet the norm. Dow internal scoping efforts have highlighted several initiatives for acceleration and enablement of the sustainability efforts through AI.

This article will focus on water as a concept and briefly explain some of the different initiatives in Dow.

WATER REUSE BY ADVANCED AND DYNAMIC WASTE STREAM MAPPING THAT FEEDS CIRCULAR PROCESSES AND PRODUCTS

For many industrial processes, monitoring water consumption and reuse has become a priority to protect available water sources in the environment. Terneuzen, Dow's largest manufacturing site outside the U.S., is also water stressed. 75% of the annual 22 million cubic meters of freshwater use comes from sustainable sources like recycled and reused wastewater. By using advanced water quality monitoring and optimization techniques, Dow is working towards using 100% of sustainable sources for its water supply by 2024. It will be one of the first

sites in The Netherlands that can accomplish this on such a large industrial scale.

Two initiatives currently in place to achieve this goal are the participation in the EU consortium AquaSPICE, where advanced digitalization is a key deliverable, and a water-specific Cyber-Physical-System (WaterCPS) that aims at using digital twins of industrial and value chain entities to optimize water efficiency at different industrial levels.

PREDICTABLE WATER MANAGEMENT BOTH ON SITE AND EXTERNAL

In this area there are multiple efforts around monitoring and prediction (or modeling) of components that negatively impact the performance of the wastewater treatment plants. The development of soft sensors is an accepted practice in Dow. An example is the much faster prediction of key components for environmental compliance using image data for a wastewater analyzer. For instance, using Flowcam image analysis to characterize solids in wastewater. Dow also collaborates with universities (TU/e included), like in the AquaConnect project, where a model will be developed for water use and distribution for a water shed.

In the examples shown above, we only scratch the surface of how the power of AI can be used to achieve ambitious sustainability goals. As digitalization and AI advance, they will continue to impact the sustainability aspect of the chemical industry, where -in the end- we all will benefit.

COMPANY



THE IMPACT OF CULTURE IN LEARNING

Hope you're doing well after this full year of COVID. It's now officially been a year since I've been back in Brazil and, let me tell you, I've had a *REALLY* bumpy ride this past year, but I digress.

TEXT Leticia Malagutti

NOMADIC DAYS

I'll start with a quick summary of my life in the field of moving away. As you may know, I'm Brazilian! I was born and lived most of my life in the capital, Brasília. In 2010, my family and I moved to Rio de Janeiro for a year, while my dad did a course kind of like a pre-master program. After that we moved back to Brasília, where we stayed until 2014, my dad was accepted for a masters program at King's College London.

“...the current Guinness World Record for the most translated book by a living author is held by Paulo Coelho, a Brazilian author...”

In August we moved to London, where we lived for a year and a half. 2017 was a weird year for me: in January I was living in London, from January till mid-March I lived in Rio, and then I moved back to Brasília, where I stayed until moving to Eindhoven in 2019. Then, in March 2020, I had to come back to Brazil with my family because of COVID. With the whole situation, I ended up asking for a sabbatical year at TU/e, and in January 2021 I resumed uni in Brazil as I wait to go back to Eindhoven. This all being said, I think I have a slightly different view than most people when it comes to learning, since I've not only heard about, but also studied in several different curricula both in high school and in uni.

CULTURAL DIFFERENCES

As a big country, Brazil is full of different cultures and traditions. This richness makes almost every state different from one another, and I never thought that could impact the learning experience as much as it actually does. We overlook these small differences in day-to-day life, but when you start realizing the impact that social relations, for example, have on learning, it's quite cool to see how much something can impact the way you view studying or reading, which has a big impact on the learning trajectory.

According to research performed in the Netherlands and published on the website Statista, between January 2019 and January 2020, 48% of the respondents had read 6 or more complete books throughout the course of the year. In contrast, the Brazilian news platform G1, with information provided by IBGE (Brazilian Institute of Geography and Statistics), shows that the average for finished books in Brazil is 2.4 books. That is really not a lot! Especially considering that, on average, schools ask for students to read 3 books a year and more than half of the participants said they would usually read by indication of their schools or teachers. That same research showed that The Bible is the most read book in Brazil, while other religious books were in third place, so 2 of the top 3 positions are occupied by religious genres. It seems that we just really don't have a strong reading habit. Even more weird is the fact that the current Guinness World Record for the most translated book by a living author is held by Paulo Coelho, a Brazilian author, with the title *The Alchemist*.

WHAT I'VE SEEN

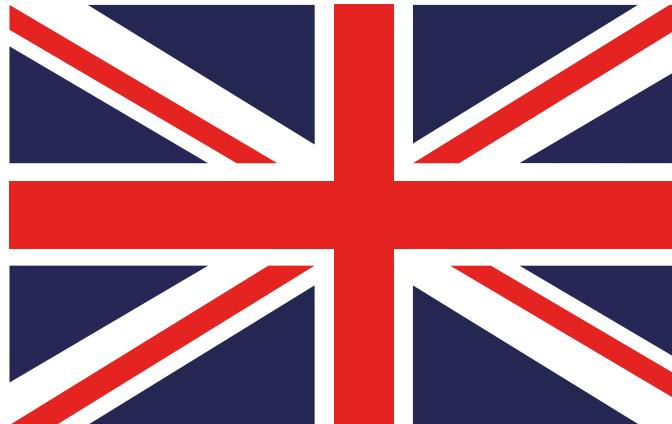
RIO VS BRASÍLIA

Being in the same country, I didn't think there would be sufficient cultural differences between Rio and Brasilia to have a relevant impact on learning, but it was because of this comparison that I started paying attention to the changes. In Rio people are more welcoming and it's a lot more common for friends to study together and help each other out in school than what I've seen anywhere else. Every day, I'd have one of my friends inviting me over or asking me to stay in school to study/do homework/finish assignments together, and this is not an exaggeration. Uni makes things a bit different, but for schools, Rio definitely has a higher stance at this than any other place I've seen.

BRAZIL VS LONDON

With many, MANY cultural differences between the two countries, it didn't seem fair to compare much, so I'm going to focus on the difference between systems. In Brazil, we have 12 years of school, much like the American system. In the UK, however, things get a tad complicated since you have 11 years of mandatory school, but after that, you have 2 (optional) years of what they call Sixth Form. I've always thought of Sixth Form like the American College: to get into the best unis, you have to have a good mark in Sixth Form. You begin preparing for it between Years 9 and 10, where you start choosing your courses for Sixth Form. Much like the little I know about the Dutch system, you choose the courses you like the most, for example, you don't have to do geography, history, sociology and philosophy; you choose one or two of the four. While in the UK, your marks in school determine your Sixth Form applications and your marks in Sixth Form determine your uni applications, in Brazil your marks in school won't affect your uni application directly. That can be both beneficial and prejudicial, in my opinion: on one hand, you don't have to perform well in school to get into uni, on the other, your approval depends solely on a 2-day-5-hour-exam that covers 15 subjects, which happens only once a year. It's intense, to say the least!

Another big difference is that schools in Brazil usually start at around 07:00 and end at around 12:30. In the UK, usually, school starts at around 8:30, with 30 minutes of tutor group until 09:00, when classes start and school goes until around 15:00. Due to the smaller classes, in Brazil teachers tend to know most of their students by name and have a more personal connection to them. I've always felt like my teachers in Brazil would notice more when I was having a bad day and ask if there was anything they could do to help. In the UK, this was more of a thing your tutors had to pay attention to, I reckon.



BRAZIL VS. EINDHOVEN

While in most European countries (that I know) you are expected to at least have a look at the materials before the lectures, in Brazil, the common practice is to do the opposite. Often, I've seen people studying the book before the lectures while I was at the TU/e, and at the beginning, that always struck me as very odd because I kept thinking to myself "how are they understanding the book if they've never seen that before?". One day it hit me that most people weren't reading the book to understand the book itself, but more so to understand the lectures when we came to have them. Most of the time, I wouldn't understand anything being said in the lectures and I wouldn't have time to go through the book to understand it more because of the assignments and exercises we were meant to do and it suffices to say that things always snowballed, but I would never understand why. I've noticed that most of my successful friends at the TU/e were the ones who prepared for



the lectures beforehand. Not because they understood the content before, but because they were able to understand it better during the lecture itself. In Brazil, things kind of go in reverse, the most successful people are the ones who study afterwards. That makes a bit of sense when you consider that most teachers don't follow a specific book and the course structure is more of a guideline than a structure per se. Another difference I've noticed is the fact that we tend to have fewer assignments, but we almost always have two exams instead of one.

However, the most notable difference between both types of universities is the way our year goes. While in Eindhoven, we have one full year split into 4 quarters, in Brazil the year is split into two separate semesters. In each quartile (Eindhoven), we have around 3 courses that begin and end along with the quartile. In Brazil, however, the semester is split into two chunks, one before the first exam and one before the final exam, and you have the same 4 courses (usually) throughout that specific semester. It's also a common practice in Brazil to have people entering both in January and in July since each semester is separate, but most people will get in in January since most schools end in December. With that, while in the Netherlands you can only apply for that specific course once a year, in Brazil you may be able to apply twice a year, depending on the university and course, obviously.

CONCLUSION

After having spent days on end trying to find a conclusion to summarize what I was trying to say with this and just feeling like I was repeating myself a lot, I think I'll just leave it the following: from my experience, culture has a big impact not only on the way courses are structured, but also in the learning process as a whole. Social relations are different depending on where you are and that ends up having a bigger impact than we would usually realize. I think it also has to do with the people around you and it's why I like being an international at the TU/e. I can't say things are perfect and we do suffer a bit, but I think at the end of the day you and the people who surround you are the ones who can really begin to make an impact on everyone around you.

ADVICE

If you're a Dutchie reading this, try to help out any internationals you see around you. It's bad enough being away from family and in a place where you don't speak the language.

If you're an international reading this, don't give up on meeting someone new just because they're not international students or from your own nationality. You've chosen to study in a different country! Why would you simply skip the opportunity of meeting people from different cultures?

I do want to say a special thanks to all of my friends, my Intro Family, and the 38th and 39th boards for not letting me feel like I wasn't welcome just because I was an international, and not letting me be the only one shouting "ENGLIIISHH!!" when people were talking Dutch. You can't possibly know how much that means to me!

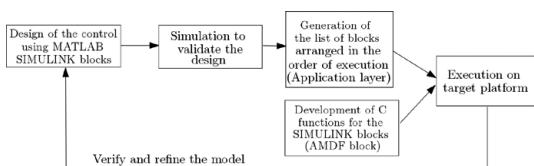


FRAMEWORK FOR MOTOR DRIVES

AME Motor Drive Framework (AMDF) is a software platform developed for power drives in order to standardise the control blocks. AMDF is versatile for a wide range of power drive applications, eg. battery management units, motor control units and power conversion.

TEXT AME - Samyuktha Sivaram

The key feature of AMDF is that it supports model based software development. Model based software development enables the translation of a simulation model to embedded software and is shown in Figure 1. This feature will ensure that the embedded software is in accordance with the designed control loop thereby avoiding any discrepancy in functionality during code development.



1

Block diagram for model based software development

The control scheme is designed and validated in simulation and a list of the SIMULINK blocks used is generated using a MATLAB script. This list is a .h file and gives information on their interconnections and configuration. This list is specific for every control algorithm and hence unique for each application. Based on the design, each block has been programmed in C and these blocks can be reused.



ADVANTAGES OF AMDF BLOCK

- » Reusability of code - When the control algorithm has multiple instance of the same block, the corresponding C function in AMDF can be used for all the instances. For example the PI controller function in AMDF can be for both speed controller and current controller by varying the parameters.
- » Robust code development - This method of code development ensures correct implementation of the control in embedded software. The functionality of the simulation is mapped to code by the architecture thereby eliminating human error.
- » Highly optimized and efficient implementation.

AME

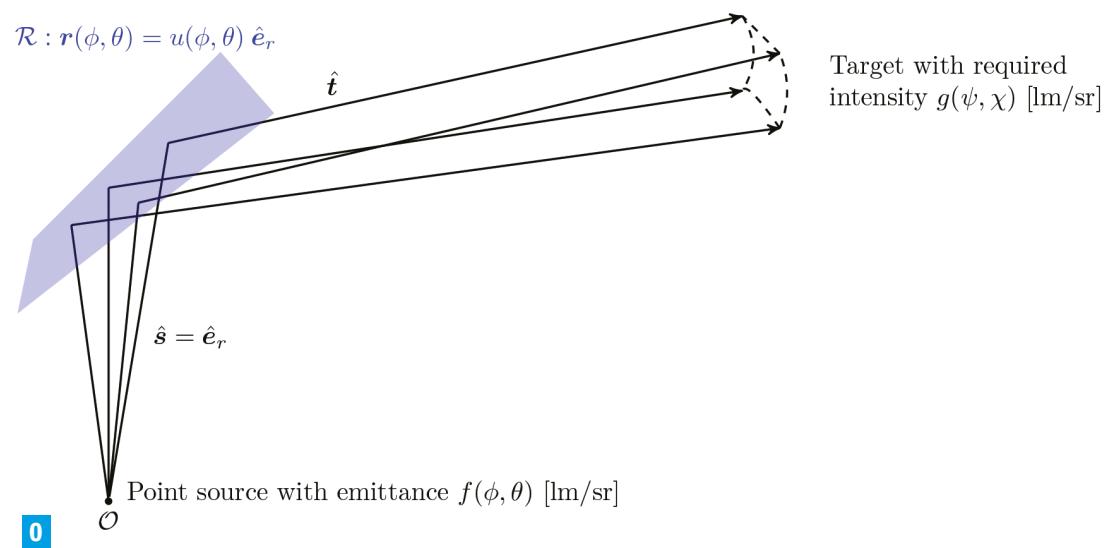
NO MORE BLINDING LIGHTS: A PHD IN SMART LIGHTNING

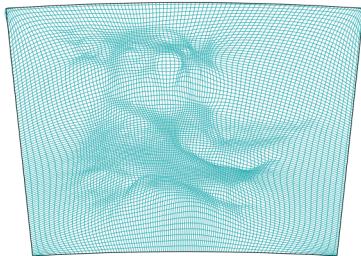
I grew up in Eindhoven, the city of light also known as 'Lampegat'. After studying in Amsterdam and Melbourne for six years, it was time for me to come back. With no sense of direction, I arrived at the Eindhoven University of Technology to see if I could apply my modelling and numerical mathematics background close to home. Very soon I started my PhD in illumination optics, under the supervision of Jan ten Thije Boonkamp, Wilbert IJzerman and Martijn Anthonissen. I am currently in my fourth and final year. In this article, I will give you a brief look into my life as a PhD student and my research. Feel free to contact me or my supervisors if you're interested and would like to know more.

TEXT Lotte Romijn - Computation Illumination Optics at the Centre for Analysis, Scientific Computing and Applications (CASA)

As a Bachelor's or Master's student you will probably have a general idea of what life as a PhD student will be like. At the time, I was worried that I would feel alone, get stuck in my mathematics or that I wouldn't be good enough. After starting the degree, I could steadily shake off these worries. The computational illumination optics group and CASA are very welcoming and my supervisors are always available for discussions. The subsequent years have brought me lots of experiences. I completed courses on optics, joined the departmental PhD council as secretary and treasurer and I worked at Signify once a week. As a

PhD student, you also have some teaching duties, which brings more variety to your weekly schedule, but most of my working time was spent finding a solution to a mathematical question, debugging code, and wondering if I was asking the right mathematical questions at all. This can be frustrating at times, but nearly all of your colleagues (and office mates) are in the same boat as you. After each stint of hard work, I personally loved the process of writing a research article. Your first publication will feel like the greatest victory ever!



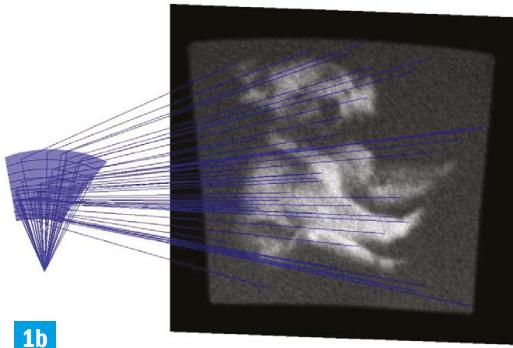


1a

In the remainder of this article, I will tell you more about the content of my PhD research. I am working on the mathematics for the design of LED lighting systems. The popularity of such systems has increased significantly in the last decade. A major advantage is that an LED light operates at lower temperatures than conventional light sources and plastic materials can be used for the optical components of the lamp. Modern optical components are freeform (i.e., non-axially symmetric) reflectors and lenses that transform the light from the LED source into the required light output of the lighting system. The main question is: how do we compute the shapes of these reflectors and lenses?

“ Your first publication will feel like the greatest victory ever! ”

Given a particular source light distribution and a given target light distribution, what optical system should be placed in between? The methods for optical system design can be categorized as either forward or inverse methods. Forward methods most commonly involve Monte-Carlo ray-tracing techniques. A large number of rays are traced through the system and the optical surfaces are modified to get the desired light output. Drawbacks of forward methods are that ray tracing is slow if high precision is required and that the approach is often based on trial and error. Inverse methods directly compute the optical system converting the light from a given source distribution into a specified target distribution. Our inverse



1b

0

An optical system with a point source and far-field target.

1

A computed reflector that transforms the light of a point light source into a projection on a screen in the far-field of the koala (iStockphoto ID:801003214). The rays are reflected and arrive on a screen at $y=10$ with local Cartesian coordinates (ξ, η) .

(a) The mapping. (b) We verify our surface by ray tracing, which generates the picture of the koala on the screen.

approach is based on first principles and uses geometrical optics and conservation of energy to derive a partial differential equation (PDE) for the optical surface. We construct an optical mapping that connects coordinates on the source and target domains. Substituting the mapping into the relation for energy conservation leads to a nonlinear second-order elliptic PDE. This PDE is known in several fields of mathematics and is called a generalized Monge-Ampère equation.

“ The main question is: how do we compute the shapes of these reflectors and lenses? ”

In Figure 0 a point source emits light radially outward and we consider a source emittance in spherical coordinates $f(\phi, \theta)$ in [lm/sr], where $0 \leq \phi \leq \pi$ is the zenith and $0 \leq \theta < 2\pi$ is the azimuth. The target intensity distribution $g(\psi, \chi)$ in [lm/sr] is expressed with respect to a different set of spherical coordinates (ψ, χ) , with zenith $0 \leq \psi \leq \pi$ and azimuth $0 \leq \chi < 2\pi$, with origin the optical surface approximated as a point in space (far-field approximation). The surface is parametrized as $r(\phi, \theta) = u(\phi, \theta) \hat{e}_r$, where \hat{e}_r is the radial unit vector in the spherical coordinate system. The ray $\hat{s} = \hat{e}_r$ is reflected into direction \hat{t} . We can derive the optical map using the laws of geometrical optics, usually written in the form $y = m(x, u, \nabla u)$, where x and y

are related to the source direction \hat{s} and target direction \hat{t} by coordinate transformations (i.e., stereographic projections). The energy balance takes the form

$$\det(D\mathbf{m}) = \frac{\tilde{f}(\mathbf{x})(1 + |\mathbf{m}(\mathbf{x})|^2)^2}{\tilde{g}(\mathbf{m}(\mathbf{x})) (1 + |\mathbf{x}|^2)^2},$$

where $D\mathbf{m}$ is the Jacobi matrix of \mathbf{m} , $\tilde{f}(\mathbf{x}) = f(\phi(\mathbf{x}), \theta(\mathbf{x}))$ and $\tilde{g}(\mathbf{y}) = g(\psi(\mathbf{y}), \chi(\mathbf{y}))$. If we substitute $\mathbf{m}(\mathbf{x}) = \mathbf{m}(\mathbf{x}, u, \nabla u)$ into this equation, we get the generalized Monge-Ampère equation.

We solve the PDE numerically using a least-squares algorithm. We first compute the optical mapping, and subsequently, use it to compute the location of the optical surface. For instance, Figure 1 shows the results of a reflector that converts the light from a point source

in a target distribution corresponding to a grey-scale image of a picture of a koala. We show the mapping in (a) and the computed surface is verified via ray tracing in (b). The numerical algorithm can produce quite complicated intensity distributions. Currently, it can be applied to a wide range of optical systems with parallel sources, point sources, near- and far-field targets and multiple freeform surfaces.

If you're interested in pursuing an early career in optics (BSc, MSc and PhD projects), feel free to visit <https://www.win.tue.nl/~martijn/Optics/> for more information. We also work on improved ray-tracing techniques, the incorporation of scattering phenomena and aberrations, and we are expanding our research to optical systems for photolithography in collaboration with ASML.



nfimum: A strange or funny quotation from a teacher, a student or faculty member.
Here you can find infima sent to the Supremum committee via inf.gewis.nl.

Alex: "Als je het zekere voor het onzekere wilt nemen zou ik maar wel gewoon jezelf verhongeren."

Anne over een avondklok: "Het klinkt eigenlijk wel spannend"

tijdens het testen van de infima

Rink: "Ik zal wel even een test doen om te kijken of hij nu niet naar iedereen doorgestuurd wordt"

Sanne de W.: "Anders wacht je gewoon weer tot ik iets doms zeg"

Jealy 10 minuten nadat de presentatie van de WISO gastsprekers over Ron Boszhard is begonnen: "Wie is deze gast?"

Max: "RON BOSZHARD!"

Jasper D.: "Democratie is toch gewoon kut als je eigenlijk gewoon zelf beter bent?"

Anne: "Hoe heet een Oedipus complex voor vrouwen?"

Eline: "Uhm je bedoelt gewoon daddy issues?"

Jasper D.: "Maar het zijn sjaarzen hè, die moeten zich al verontschuldigen omdat ze sjaars zijn."

Kevin J.: "Er zijn wel database engines die BigInt aankunnen."

Rick W.: "Ja, die hebben ze ook bij de GGD om het gewicht van je moeder op te slaan."

Matthijs L.: "Was ik maar een Brand-biertje. Dan was ik sneller dood."

Wouter bekijkt voetbalplaatjes: "Ik ken deze club niet eens."

Irne: "Het Nederlands Elftal?"

Koen van den B.: "Oooh de euros in de C4 agenda zijn voor hoeveel je moet betalen? Ik dacht hoeveel geld je binnen had gehaald!"

Sanne: "Ja ik heb dus echt geen Flugel-neus, Ada Lovelace wel!"

Robin C.: "Ik doe ze in de koelkast en dan worden ze lekker hard en kun je er op sabbelen."

Celine de J. tijdens Algebra & Discrete Mathematics instructie: "Ik vond het even heel raar om te zeggen dat ik niet weet wat C4 inhoudt."

Leon V.: "Mijn wachtwoord is nu '5ecr3t5ecr3t', want ik moest mijn wachtwoord wijzigen en ik had 'qwerty' en zo al gehad."

Lars: "Weet je wat ik me besefte, als je een lepel binnenstebuiten keert, heb je nog steeds een lepel."

Arend: "Palindroom?"

Lars: "Zowel in woord als in bestaan."

Irne wordt genomineerd voor de J.E.M.O.E.D.E.R. adt-wedstrijd

Irne: "Dit zet ik even op m'n Trello."

Sanne de W.: "Leon heeft een punt; geef mij maar twintig centimeter."

Anne: "Ha, die politieauto rijdt op de busstrook!"

Ruben: "Oh shit, wij ook!"

Leon: "Als de drugs in de eten zit moet je toch minder honger worden?"

Amber tegen Lars V.: "Ik ben niet zo thuis in tongen."

Saskia: "Het voordeel van een lijk is dat die niet overal naalden achterlaten."

IN
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A

GEPWNAGE is back on fire!

Retrieved from the ashes of
the fotowoordenboek,
we found the most coronaproof
OTOS.

After a year where we had to blow out birthday candles with so many friends that it seemed we were friendless, and not being able to go further than your garden fence. Though we might be home alone , being productive and working we have to watch out that we do not get a Burn out. To prevent this from happening just geek play some online games with friends to get that fire in your belly burning, order some food , relax and join weekend activities such that you'll have an amazing free time.



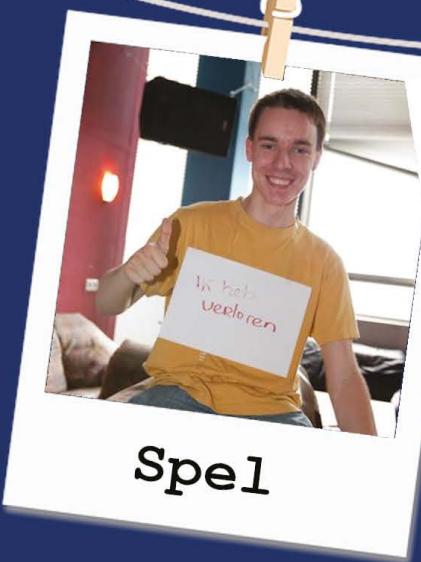
Vrijetijd



Vriendloos



Tuinhek



HOME ALONE



LES, LER AND HERB

I believe it is somewhat ironic to write my (presumably) final article about a band which's name translates to 'first': Primus. I feel, however, like now is the correct time to finally highlight the exceptional musical behavior of this group. A band that drools on rules, does not care too much for melody, considers rhythm as just a concept and has a general disgust for anything conventional. They probably do not knowingly and actively emit this image, but at least that is the vibe that I get from them. A vibe that I believe everyone should be in every once in a while.

TEXT Lars Verstraelen

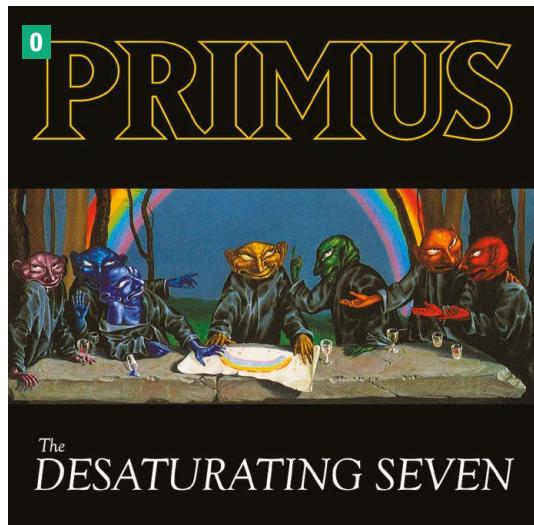
I have to dig quite deep to find my first connection with Primus. I believe I heard about them by means of street talk: I heard of a freaky band, who had no care for the beauty of music but instead rather allowed their storytelling to flow within their musicianship – not being bothered as to how it would sound. This idea of their music was further strengthened by the fact that the snippets that I saw from their music videos and album covers did not look as if they were supporting music with apparent seriousness. In their video for 'Wynona's Big Brown Beaver', the band members stroll around in their action figure-esque cowboy costumes, they performed dressed up as penguins on David Letterman and the album covers for 'Sailing The Seas Of Cheese', 'Pork Soda' and 'Antipop' feature Claymation artwork as if it was pulled from a Wallace & Gromit movie.

Prior to listening to their complete records, I discovered their musical ventures not mentioned on their albums. If you ever watched South Park, for instance, you are very likely to have been exposed to Primus's music. They did not just make a musical appearance in the famous Guitar Hero episode, they in fact made the South Park theme song. Fun fact: the original recording of it was made mere minutes after they played a show in Colorado, 1996. They also made the very ballsy move of covering Master Of Puppets by Metallica in the most non-serious way possible at Woodstock in 1994. The first glances I got from them were not the ones I would get from a band who would take themselves seriously.

Understanding and admiring Primus seemed like an utmost impossible task at first glance. Now, if that is no invitation to listen to some new music, I do not know what is. I listened to the whole of 'Sailing The Seas Of Cheese' and it was an experience, to say the least. Up to some degree, it is really difficult to even call it music. I'd like to refer more to it as a mangled radio played with a drumbeat over it, attempting to sound as music; the stories being pulled straight out of a demented children's book. This might seem as if I absolutely abhorred my first Primus experience, while it in fact opened the doors for me to new musical ventures. Primus did something in my opinion that few bands have done in the past: stripping away essences of music.

The reason why I believe Primus shows some insane creativity lies in the extension of why The Ramones have been argued to be musical geniuses. What the Ramones did, in a time where Jazz and Rock 'n Roll still flourished, was stripping away everything from music that needed technique. They got rid of all the riffs, most of the solo's, kept melodies as simple as possible and did not sing about special subjects. They basically went down to the core of music and built a whole legacy around it. Primus did something similar: instead of stripping music from technique, they got rid of everything that had nothing to do with storytelling. Primus did not believe in music as a carrier for the story, but rather viewed stories as carriers for music. The vast majority of their songs

revolves around some weird, made-up story, caring only for what would strengthen the story in a musical sense. They discovered that it is not necessarily a great riff or a great solo or beat that makes a good song, instead, they considered that a good accentuation of the storyline makes a great story, all while containing a lot of musicianship in the group: just not applied to overly fancy musical arrangements.



Never would you hear anyone state that Primus is a collection of over-pretentious and pompous musicians. However, the musical collective that they are comprised of surely could be that of a more serious, musical band. Bass player and singer Les Claypool has always had a strong connection to Prog Rock in general. He is a huge Rush fan, Genesis fan and probably a fan of way more of those classic Prog Rock bands. As a self-taught bass player, Claypool elevated himself as a 'lonely-at-the-top'-type talented musician; re-inventing slap bass, being one of the first bass players to actively use a whammy bar on his bass and generally having a good ear for a good accompanying bass line, without it sounding pretentious. His stage presence is that of a lunatic – walking around like a medieval jester, wonkily bopping up and down; not your typical run of the mill type rock musician. It is kind of logical that Claypool is considered as the backbone of Primus with his unique way of playing and his even weirder sense of storytelling, where crazy stories of everyday fishermen and the humorous fall of the American dream pass in review.

I am careful with stating that Claypool can 'kind of' be considered the main figure in Primus. In reality, all of the music is composed as a group effort. Guitarist Larry 'Ler' LaLonde, having a quite serious history as the guitar player for bay area Thrash Metal group Possessed, understands exceptionally well how he can be of value to Primus. His guitar playing is wild, various and his style relying more or less on the concept of creating soundscapes to accentuate the story instead of playing fancily over the music, like every guitar player would (not to generalize, but let's be honest). Drummer Tim 'Herb' Alexander can be considered as the more serious musician of the collective. This time not because he genuinely wants to be more serious, but because of the fact that a tight percussive section is needed to tie up the whole presence of Primus. I'd argue that without Alexander, the music would sound more like Avant-Garde than music.

What would be the take away of a band that makes music, not for the beauty but for the story? After all, we listen to music to feel comforted up to some extent by soundscapes and melody. I believe that Primus is still a band that falls in the category 'listenable', but with a very skewed emphasis on storytelling opposed to songwriting. One could still enjoy the stories, and I argue even the music. It is however good to sometimes NOT embrace comfort, but to accept music as it naturally wants to be sometimes: a tool for the story and not the story itself.

- 0
Primus cover
- 1
Primus band members



ANTI PATTERNS IF YOU ARE NOT GOOGLE

Software developers are well aware of patterns in the context of programming, such as how to decorate an object or how to create a façade. And also the opposite - anti-patterns - things you should ideally avoid, such as relying heavily on the singleton pattern.

TEXT Roel van Duijnhoven (CTO JouwWeb)

Similar patterns are also found at a higher level: how to organize your codebase, or how to run a company. The thing is: the people who blog, write, and speak about these patterns are most often those working for the larger companies in this world. They preach about what works for them. But these are most likely anti-patterns if your company employs less than 100 people. So what are those anti-patterns, for those of you that don't work at Google?

Our company, JouwWeb, is an Eindhoven-based software-as-a-service company. To date, our web tool has helped over 60,000 paying customers build and maintain their own websites. But we've achieved this with a team of only 15 people, by keeping things simple and by not following what the big players preach.

MICROSERVICES

Traditionally, a web application used to consist of a single big application that would do everything from sending mail to generating reports for administrators. The new way, we are told, is a microservice architecture. A microservice is a small standalone application that serves a single purpose (for example, Spotify has a microservice that only returns meta-information about songs). And as the lore says we need this to achieve a scalable system that avoids complexity.

However, in doing so, you get complexity at the systems level, wherein a lot of systems communicate with each other. And you can no longer solve problems globally anymore. Multiple CI environments, programming languages, and databases start appearing and will need to be supported!

So indeed, the problem with a monolith is that you can wire together parts of an application that really shouldn't be talking to each other. And in doing so you create a complicated spaghetti system. And this does happen. But it's not inevitable. Not at all.

Simply applying the craft of programming can solve this: we can define and maintain soft boundaries between groups of unrelated entities ourselves, and model side-effects using events. All this can be done in code, and it's not rocket science.

And what about scaling? At JouwWeb we simply scale our entire PHP monolith horizontally in the cloud. It manages 1000 HTTPS requests per second just fine. Where possible, we do use managed cloud services that are known to scale infinitely for services like database, caching, and the like.

Do you really need to run a critical piece of your code in isolation in its own service? Well, because we maintained our boundaries within the monolith, this is still entirely possible. So we can extract this, once it really starts to hurt (but not sooner!).



JAVASCRIPT WEB CLIENT WITH API

We're told that the ideal way to run a web application nowadays is to have a versioned API backend that serves JSON, and a fat JavaScript client that consumes that API and renders to the user. And obviously, those are managed by two separate teams.

Scratch that! We intentionally built a backend-first application. This means that, by default, our PHP application serves you HTML, and we gracefully improve that HTML using Javascript bits here and there. Only when we require more interactivity do we pull out React, to properly model that part of our system.

“ All this can be done in code, and it's not rocket science. ”

That means: a single team. No misunderstandings between teams. No need to duplicate your entire domain model. And someone within the team can pull off a feature on their own, both back-end and front-end. Awesome!

And you get a high-performance website for free! No need to worry about big Javascript packages that need to load in order for the page to function properly.

MAXIMIZE NUMBER OF EMPLOYEES

If you think about the anti-patterns we discussed above, they're really a solution for having too many people working on the same project or code-base! Obviously, if you have more than 100 people working on the same thing, you need to split things up. And when you look through that lens: either Microservices or an API layer are valid solutions.

But I think we've touched on another anti-pattern here: do you really need to maximize the number of people working at your company? Things are known to get complicated once you grow above 50 people anyhow! Managers start to appear everywhere, and you as a developer are forced to specialize. So, why not try to prevent this issue in the first place?

Actively think about what the impact of either a business or architectural decision is going to be. Why not optimize for simpler systems that can be understood and maintained by fewer people? Or automate things, so it disappears permanently!

CONCLUSION

Of course, you should also take these words with a grain of salt. But I hope this encouraged developers working in a small team and those about to start a business, to push back whenever things start to get complicated! Don't follow the path laid out by Big Tech, but make decisions that make sense for a team of your size!

Roel started JouwWeb as a side project during his BSc CSE in Eindhoven. After finishing his Master's degree in 2013, he started working at JouwWeb full-time.



MEET THE KANDIES!

THE PEOPLE WHO WILL MAKE SURE GEWIS DOESN'T BURN DOWN NEXT YEAR

We cannot buzz around campus as much as we want to, but we still want to introduce ourselves! Therefore we have written some text for one another. Bee sure to take a look at our fantastic kandie outfits, otherwise you might bee confused by some of the puns in this article. We hope to talk to you all soon again in 'het Dakterras'! Now we will quickly zoom into each kandie.

TEXT The candidate 40th board

SANNE DE WIT

In the picture, Prins Sanne I can be seen in her natural habitat. Next to her *blazing* career as Prins Carnaval, Sanne will also be the chair of the upcoming 40th board.

Sanne, who is now 21 years old, was born in *R(h)otterdam* and raised in Ridderkerk. When she started studying Computer Science and Engineering three years ago, she moved to Eindhoven. Now, when a '*torrid*' emergency occurs at Stratumseind, she can be there on a whim.

Three years ago, Sanne became active at GEWIS when she joined FYC Pushpin. Over time, she joined *glowing* committees like Stijl, YBC19, and Supremum, where she pursues her interest in design. Sanne also is a member of fraternity Athena, where she often has cozy gatherings and *heated* workouts.

Besides her life at GEWIS, Sanne likes to hang out with friends, have a drink, or scour the bright nightlife of Eindhoven. Sanne also has a *burning* passion for



women's equality, which shows in her *fiery* motivation to pursue her goals and ambitions.

If this piece about Sanne *sparked* your interest in her, you will be able to find her more and more often at GEWIS. Here, you can always invite her to drink a *hot* cup of tea with you.

NOA BLIEK



This lady with *flaming* red hair goes by the name of Noa Bliek. Noa was born some 21 years ago in Amersfoort and moved to Eindhoven when she started her bachelor Applied Mathematics three years ago. Noa has been active at GEWIS ever since joining FYC GeDoE. She is a *spirited* member of C4 and an even more *fiery* chairman of GSM. At GSM, she is responsible for all *hot* topics posted on GEWIS's social media. Furthermore, she is vice-chairman at fraternity ATHENA, where she *sparks* enthusiasm for everything sweet.

Often when Noa is not at GEWIS, you can find her at

home under her warm blanket. She loves hot weather, but her skin does not: when the sun is *ablaze* in the sky, you can often find her with a nice *sunburn*. However, this does not stop her from visiting her favorite animal in the world, because Noa's heart *melts* when she sees sheep. Or baby Yoda. Or cats.

Anyway. If you find yourself in a meeting with Noa and hear someone typing very loudly: know that Noa also has a *burning* passion for minutes. Her excitement is reflected as her fingers fiercely *blast* on her keyboard. She will be able to express her excitement as secretary next year! Do not hesitate to talk to Noa if you see her at GEWIS: she is always in for a chat or some *hot gossip*.

GIJS DE MAN

The guy you see in this picture is Gijs de Man (yes, his real surname is "the man"). Gijs is a third-year student of Computer Science and Engineering who is 20 years old. With his *ardent* passion for studying, he will be completing his bachelor's this year with *blazing* grades. So without further ado, let's *fire* away with some more information about Gijs.

Until recently, Gijs lived in a town called Hurwenen, which is located somewhere between the largest rivers of the Netherlands. His favorite pastime activities are playing *fiery* games with friends, speed-solving Rubik's cubes until his hands are *burning*, making fancy LaTeX templates, and playing an intense soccer match when he has the time. He is always down to have a drink or go to a party, but do keep a close eye on him in these situations. It might just happen that Gijs runs off in the *heat* of the moment, then you can often find him



enjoying free welcome shots at the door!

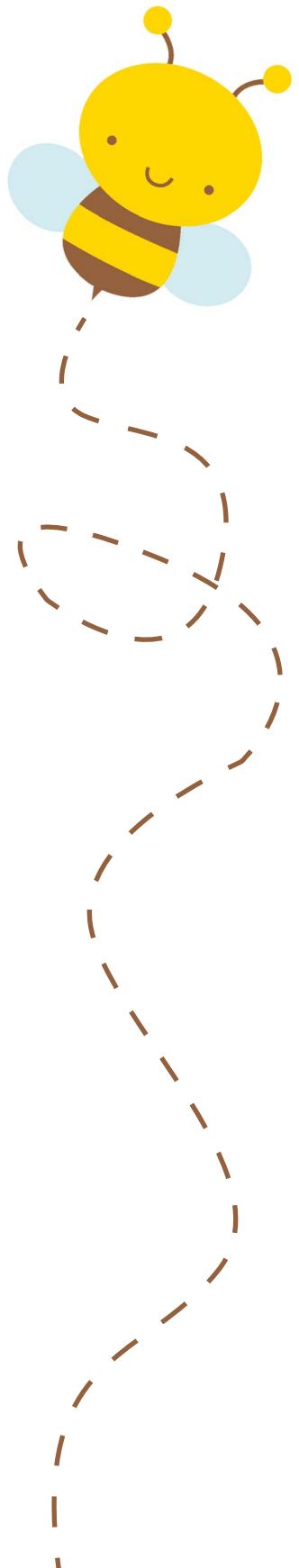
You might know Gijs already from multiple different places. For one, he was a member of (unarguably) the best FYC 19-0-8716-7160 Beercode. You might have also seen him at the past introduction week in his *lit* outfit or when he is giving his opinion on education in a *heated* discussion in the program committee or the SR.

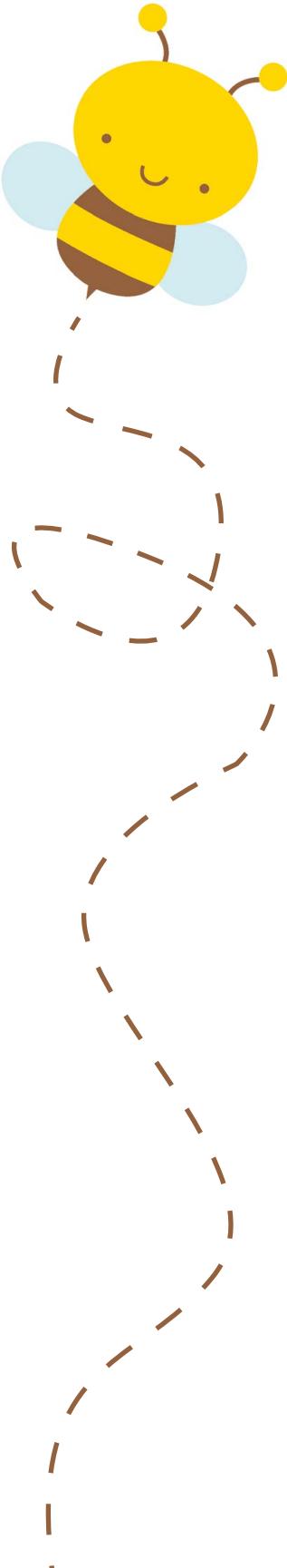
Next year, Gijs will be the one ensuring we do not *burn* through all our money as the treasurer on the 40th board.

If you still have any *burning* questions or things you want to know about Gijs, he is always in for a cup of hot coffee and a chat!

LEON VRELING

Haaay everyone! If you want to know the name of the *flaming hot* guy in the picture. It is Leon Vreling and he is now 20 springs young. Before he began his Bachelor of Computer Science and Engineering 3 years ago, he lived in Kielegat (some might call it Breda).





Now he is still *stoked* to go to his parents almost every weekend. This is not only the third year he's studying, but also the third year he's an active member of GEWIS. He started his active GEWIS life by joining the *blazing* FYC Beercode, that's what made the ball roll. Now he is a proud member of ODC, GETAART, GEDWAAL, Supremum, SR, KKK21 and GSM. Yup, that's a lot.



Not only GEWIS is familiar with his ear-to-ear smile; his smile is also very famous at AEGEE where he was part of the board in 2019-2020.

You're probably thinking: Does he still have time to study? Well, he has. He even has some spare time where he loves to watch Disney movies or have a nice picnic with friends. Leon definitely is not afraid of a borrel here and there.

Next year, hopefully, he will show his *sizzling, burning, piping, steaming, smoking hot* smile to all of you as internal affairs officer.

ELINE BOUWMEESTERS



The lady in the picture is Eline Bouwmeesters and next to loving *hot* weather she loves to become the External Affairs Officer of the 40th board.

Some 21 years ago Eline was born in Nieuwegein where

she lived with her parents until she started studying in Eindhoven 3 years ago. This year, she will finish her bachelor Applied Mathematics with *flaming* grades, and next year she'll make a *blazing* start with her Master's.

Next to Marie Kondo's book, plants *spark joy* in Eline's life and she loves to share cuttings with her friends. Fortunately for her landlord, she hasn't started the art of producing *pyrophile* plants. Together with Anne, Eline loves to have *heated* discussions about who has the best and the most plants.

Her active GEWIS life started when she joined FYC Beercode where she discovered all the ins and outs of GEWIS. As a member of C4, she loves to arrange *hot* career activities for the entire association.

If you want to know more about Eline and see her around, she's always in for a *boiling hot* cup of herbal tea; no milk, no sugar.

ANNE VAN DEN ELZEN



This is Anne van den Elzen. She is 21 years old and is currently a third-year Applied Mathematics student in Eindhoven. Next year, she will be the Educational Officer of GEWIS which she is very excited about! If you need anyone to stand up for your educational rights, she is the place to be.

When she isn't studying the ins and outs of the TU/e educational system, she is probably watering her plants or buying new pots to ultimately buy even more plants. Anne will hop from hobby to hobby every now and then, so don't be surprised when you see her knitting a *hot* skirt one minute, and drawing some *flaming* monsters the next. You might also see her hopping around the campus if you don't look over her, that is. She might be tiny, but just like her once *fiery*



red hair, she can be very *spicy*.

She is currently an aspiring member of Défi and therefore only wears lilac most of the time. Luckily, doing a board year comes with a new board color so she can now have 2 colors in her closet with matching nail polish. Next to thinking outside the box, she is also busy taking *smoking hot* photos of GEWIS members with the committee GEFLITST or organizing *blasting* lunch lectures with C4.

As if being the educational officer of GEWIS is not enough, she will also try to improve our *steaming* earth with more sustainability and fight for the mental health of our students. Don't worry, even though she might look busy, you can always come up to her and chat about your weirdest dilemmas or life questions.

RINK PIETERS

Although he probably does not need any introduction, this lovely guy is Rink Pieters. All the way from



Hoogeveen in the far north, Rink moved to Eindhoven in the *sunny* south. At the TU/e he started his Bachelor of Computer Science and Engineering three years ago. At the end of this academic year, this 21-year-old will have *burned* through the entire curriculum and a *sparkling degree* will be his.

Rink already was a well-known face at GEWIS during his first year, but in his second and third year, he became active at all sorts of committees. He makes sure the money of GEWIS does not go up in *flames* in the audit committee, he keeps the servers from *overheating* at the CBC and he makes *blazing hot* templates with Stijl.

Everyone knows Rink is an information *hotspot* and during his year he will make sure everyone can find all information about GEWIS without needing his help. He will do this as our information officer. If you want to know exactly what his *burning* desires and goals for this year are, take a look at the 7th function proposal!

Next to all of this, Rink also loves to spend time with friends, it is not often you will find him eating alone since friends are always invited to come over to have dinner with him and his housemates. Talking to Rink you always learn something new, be it a *flaming* piece of information or a *hot* take on an interesting topic, so when you come across him at GEWIS, do not hesitate to have a chat with him. He probably also deserves a break from working so hard.

THE LEGEND OF THE BOITATÁ

One of the best parts of coming from a country with such a rich culture is finding out how different beliefs, folklores, religions and mythologies have a connection with the things you've grown up hearing about. So now, I'm sharing with you one of the biggest stories of Brazilian folklore: the story of the fiery Boitatá.

TEXT Letícia Malagutti

Hope you're having fun reading about these fiery stories. In the case that there aren't many articles relating to the theme of this edition, here I am!

I had thought about writing about the Forest Fires in the Amazon, but that would turn into a huge political debate, and I don't like that idea, especially considering Brazil's politics haven't been doing so well in the past 20 years... However, when discussing this idea with a friend, who also suggested it, I started thinking back about stories in Brazilian folklore that talked about beings who would protect the forest and I remembered a perfect one: The Legend of the Boitatá.

ORIGINS

If you've never seen the Disney-Pixar movie *Brave*, I strongly encourage you to do so! If you have, you're probably familiar with the Will-o'-the-Wisps (the blue fiery spirits that guide Merida to the witch's hut). But Letícia, weren't you going to write about Brazilian folklore, why are you talking about *Brave*? Patience, young grasshopper, I'll get there!

Anyways, the Will-o'-the-Wisps/Will-o'-Wisps are well-known in some different cultures, but maybe by a different name: in North America, they can be called jack o' lantern (the origin for the Headless Horseman and the Halloween Pumpkin-Lanterns); in the UK, with the exception of Scotland, they're better known as hinkypunks and even made an appearance as creatures in Harry Potter; in Thailand, they're known as Naga

Fireballs; in Norway as Hessdalen Lights; and in The Netherlands as Dwaallicht. In Latin languages, the names are more similar: in Latin itself, it's *ignis fatuus*; in Italian, *fuoco fatuo*; in Spanish, *fuego fatuo*; in French, *feu follet*; and last, but definitely not least, in Portuguese, it's *fogo fátuo*. Funnily enough, *ignes fatui* (Latin; plural), actually exist! Not as everyone around the world thought originally as troubled spirits of the unbaptized, but as a phenomenon of bioluminescence or chemiluminescence: it's caused by the oxidation of phosphane (PH_3), diphosphane (P_2H_4) and methane (CH_4) produced by organic decay; or like the YouTube channel SuperCarlin Brothers liked to call it: SWAMPFARTS!

I agree, not as cool as the ghost/spirit/fairy idea... But, because its movement is somewhat similar to the way snakes move, it gave the Brazilian Indigenous people (*índios*, who are celebrating their holiday on the day I'm writing this piece, 19th of April) a pretty cool idea: the Boitatá!

ETYMOLOGY

The word *boitatá* is actually not the original name of said creature. In Tupi-Guarani, the main original language spoken by the *índios*, *baé* - creature - and *tatá* - fire -, formed the word *baé-tatá*, however, the word for snake in Tupi, *mbói*, is quite similar in sound to *baé*, which caused confusion over what the *baé-tatá* really was. This extended to the issue of spoken-word stories being the main source of folklore and changed



the way the *baê-tatá* was viewed, therefore changing its name to simply *mboitatá*.

Something the *índios* could've never predicted, not that it would've made a difference anyway, is that the word *mbói*, which for them meant snake, would also be similar to *boi*, which in Portuguese means bull. This slight difference made the *mboitatá* have a further change in name to *boitatá*, and have two very different images. The most famous one is of the flaming snake with a body full of eyes (I'll explain this further on). The second version, however, is of a bull with one single flaming eye on its head. There are also variants of it where the flaming snake has the horns of a bull. In all versions, however, the *boitatá* serves the same purpose: to protect the vegetation.

STORY

The story of the *boitatá* was first written down on the 31st of May 1560 by the Jesuit priest José de Anchieta, where he wrote about a ghost-like creature that the *índios* called a *baê-tatá*. There are two main storylines for the *boitatá*. In both, it became the protector of lands and was in charge of killing anyone who tried to hurt

or provoked fires in the forest.

The first and most common one starts with a never-ending night. After days of only darkness, there came a flood which killed off everything in its way, except for marine life and one snake. With everything else dead, the snake was happy about the feast it was about to have. Because it was its favourite, the snake started by eating the eyes of every creature it passed, which still glistened with life and the glow of the long-lost brightness the world had. Because of its greed, the Gods punished the snake with immortality. Since it liked eyes so much, it was now only allowed to eat the eyes of wrong-doers in its lands, and every eye that the snake had and would eat was stamped on its body, now covered in the flames of the glistening eyes it had once eaten. Because the snake was now a defensor of its area, its fire was magical in order not to be prejudicial to the forest or the good-doers who also tried protecting it. The Gods decided that, much like its victims, the creature that would be known as *boitatá* would be blind.





The second storyline is based on the European belief of the Will-o'-Wisps being the troubled spirits of the unbaptized. This was mostly forced by the Jesuit priests, who wanted to catholicize the *índios*. In this version, instead of the whole flood story, the *boitatá* was simply a spirit who roamed and protected its land against fires and criminals.

Another similarity in both versions is that the *boitatá* would leave its victims blind, crazy and/or dead. The advice for the unfortunate case where you found yourself in front of the *boitatá* was to stop, close your eyes and go as far as holding your breath and wait for it to go away, but not make any movement. The biggest advice was to not try to run! It was said that the *boitatá* would follow anyone who tried running since it would think you were hurting its lands.

COMMENTS

Growing up, the story of the *boitatá* was always one of my favourites! I don't know why, I think the idea of having something to protect the lands of the usual yearly fires in the Amazon was something that soothed me and since I would never do anything to hurt my land, I felt safer. There are MANY stories in Brazilian folklore that were very interesting to me. The most similar to the *boitatá* is the *Mbói-Tuĩ*, a huge serpent with a parrot's head and beak, but I only heard about it when I was older. If you're interested, the most famous ones along with the *boitatá* are the *Saci-Pererê* (aka *Sá'sior Matintape're*), the *Boto Cor-de-Rosa* (Pink Boto, or Pink River Dolphin), the *Mula-Sem-Cabeça* (Headless Mule), the *Curupira* (aka *Kuru'pit*), the *Cuca*, and last, but definitely not least, the story of *Yíara*, a *Mãe D'Água* (*Yíara*, the Mother of Waters). All were also personal favourites, especially *Yíara*, whom I wanted to be when I grew up, which makes as much sense as wanting to be Wonder Woman. Fun fact: the Brazilian Netflix Original Series *Invisible City* depicts some of the creatures in folklore nowadays!

Something I've realised that's very unrelated to the story is that many cultures have a flood as a big event. Probably the most famous one is the one depicted both in Genesis and the Quran with Noah, but it's far from

the only one. The first one known to mankind is depicted in the Epic of Gilgamesh, and it's quite similar to Noah's, but in Ancient Mesopotamia. In the Norse myths, there's a flood with Odin's blood on Earth. China has at least 3 stories involving floods, the most famous one being The Great Flood. The Aztecs, Hindus and Buddhists also have their own stories involving floods, as well as the Native Americans (who have quite a few of them, if I'm being completely honest). The Australian Aborigines also have their own version of it, which has to be one of my favourites because it involves, brace yourselves, a thirsty frog, named Tiddalick, who drinks all the water in the world and then floods it back because he's laughing so hard... I mean... it can't get better than that.

The current hypothesis as to why there are so many flood stories dating back to the same time period is that the European glaciers began to melt at that time and the Mediterranean Sea overflowed. It seems that this overflow caused the water to move with a force that was about 200 times greater than the Niagara Falls. That would be an incredibly fast-moving wall of floodwater, and I can't help but think of it much like the one that happens at the end of *Frozen 2*. Physical evidence backs up this theory since there are stone-age structures under the Black Sea. Other hypotheses include tsunamis and suggest that comets or asteroids may have caused the flood.

Coming to a full circle, this is where I leave you to think about the impacts of human activity on the climate. I'm not the type to say that we have to stop everything we're doing so that nature can be preserved, but we SHOULD do what we can. If that for you means not throwing trash on the floor, or using less water while you're showering or brushing your teeth, or using your bike or public transport instead of a car where you can (which isn't much of an issue in the Netherlands, but still), it doesn't really matter, as long as you're doing your part! There's a saying in Brazil that depicts this idea a little bit and I think the best translation would be "grain by grain the hen fills her belly." Every small action means something.

nfimum: A strange or funny quotation from a teacher, a student or faculty member.
Here you can find infima sent to the Supremum committee via inf.gewis.nl

Sanne: "Is dat een opendak-helikopter?"

Rink: "Er zijn naast faxen weinig werkwoorden met stam op x."

Leon: "Boxen"

Wouter v. H.: "Er zit alleen geen B in 't Kofschip."

Wouter van H.: "Na het kapot laten vallen van een sixpack bier: 'Tellen gaat ook nog prima; één, twee, zes en veertig'

Leon: "Wouter is moe, hij is in zijn ogen aan het wrijven."

Rink: "Wouter heeft een bril, hij kan helemaal niet in zijn ogen wrijven."

Teacher: "We have a bunch of little minions helping us to run the course."

Roy: "Eindhoven heeft zelfs een waterscouting"

Wouter: "Theta bedoel je?"

Roy wanneer hij een sportauto hard ziet optrekken:
"Dit is eigenlijk gewoon meer benzine betalen om te compenseren voor je kleine piemel."

Bart: "Ja, het duurt waarschijnlijk, uhm... ja totdat het voorbij is."

Ilona: "Ik begin gewoon met koffie drinken, tot ik moet poepen."

Max tegen Tobin: "Weet je waar het auditorium is?"

Tim over een stofzuigende dweil: "Ik wou dat dit mijn vriendin was."

Leon V.: "Het is wel romantisch."

Wouter van H.: "Jij die ballen in mijn mond stopt?"

Leon V.: "Of jij die je mond gretig opende?"

Noa B. ziet de heilige maagd Maria met het kindje

Jezus: "Oh, het is een chick."

Wouter met een ALD fles in zijn hand: "Is deze van Rink, of van één van jullie?"

Leon: "Wouter, je naam staat erop gegraveerd!"

Arnoud's buurman vanaf het balkon: "Dat is zo wispelturig als de onderbroek aan mijn reet."

Gijs: "Ik gebruik een hele hoop, maar het meeste ervan is geen make-up :)"

Noa: "Robin stop dat ding ns in je mond!"

Bouke: "Nee, ik geloof wel dat er whisky in zit, maar de koffie is gewoon smerige."

Rick: "Duur betekend niet perse beter.."

Bouke: "Gast ik huur toch ook jouw moeder niet in voor 1 miljoen."

Chantal: "Ik ben vergeten ontbijt te halen."

Romy: "Dat is niet erg, we hebben alcohol."

Anne: "Kijk eens, de som op de infima pagina is 38! Of heb ik dat verkeerd uitgerekend?"

Susan: "Ja dat klopt niet."

Anne: "Echt"

Susan: "Nee"

Susan: "Ik heb het juiste kaartje geklikt. Nu heb ik zo'n man."

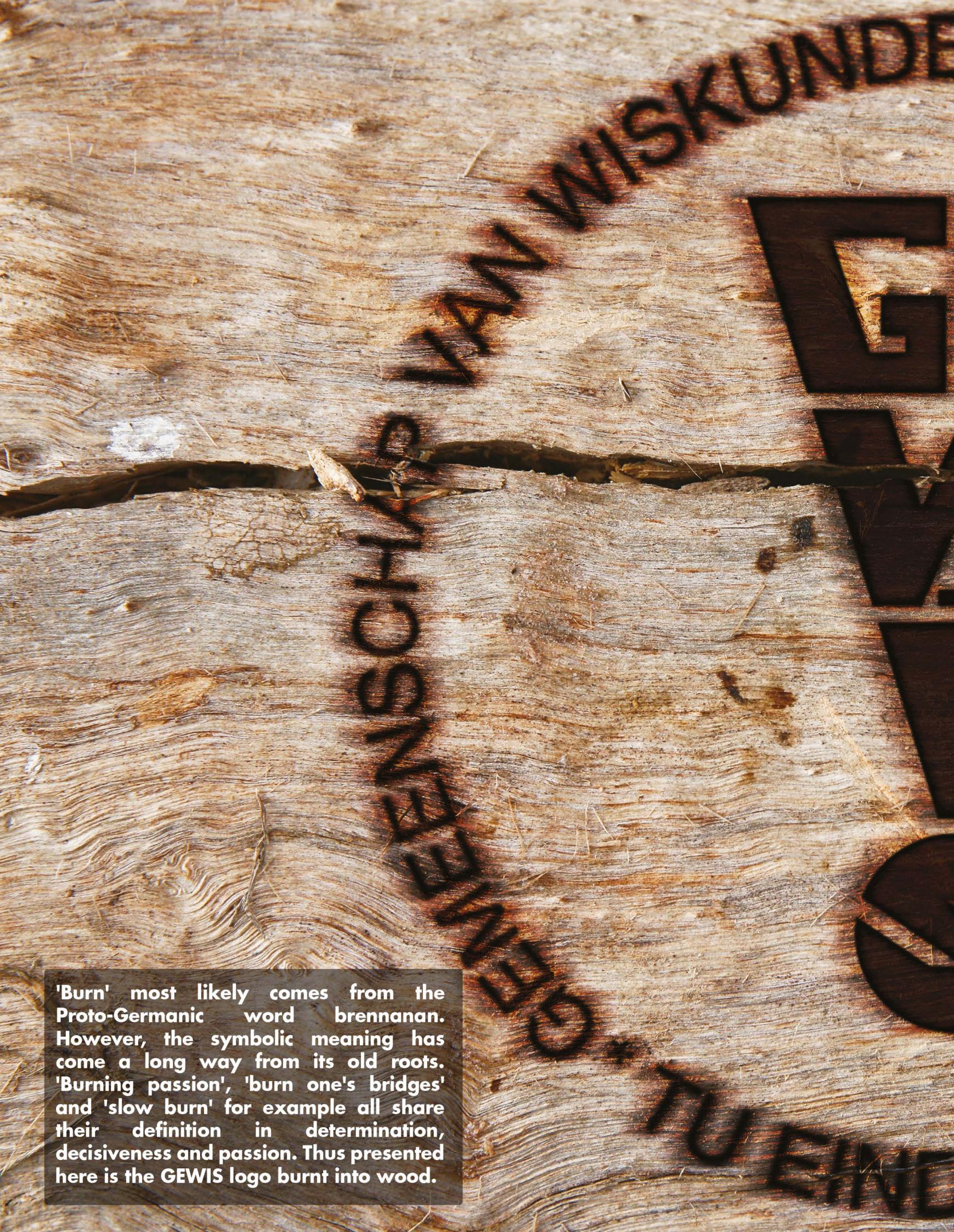
Anne: "Dat is meestal op Tinder."

Romy: "Dit smaakt zoals het ruikt: naar mijn parfum."

Roy: "New phone, who dis?"

Jealy: "IK HEB OOK EEN NIEUWE TELEFOON!!!"

INFIMA



'Burn' most likely comes from the Proto-Germanic word brennanan. However, the symbolic meaning has come a long way from its old roots. 'Burning passion', 'burn one's bridges' and 'slow burn' for example all share their definition in determination, decisiveness and passion. Thus presented here is the GEWIS logo burnt into wood.



FIRE UP YOUR SUMMER

WHi all! We are ATHENA, a fraternity of GEWIS that likes to do fantastic feminine activities. One of the things we like to do is drink cocktails, and for this edition of the Supremum, we have a cocktail in fire theme to share with you. And to keep things a bit exciting during this corona time, we also have another very special drink for you! Last summer, some of our favourite activities were not allowed anymore, but we came up with some very nice alternatives that we liked a lot, maybe even more than the old ones :)! We love to picnic outside in the sun, do a workout to keep in shape, and afterwards have nice drinks and bites. All in a corona proof manner, of course. Therefore, some advice from our side is to enjoy the following drinks outside during a picnic with some nice bites if you get the chance!

TEXT Dionne Heuvelman

WE START BY EXPLAINING THE FIRE COCKTAIL,
FOR WHICH YOU WILL NEED THE FOLLOWING
INGREDIENTS

- » 50 mL cranberry juice
- » 30 mL gin
- » 30 mL limoncello
- » (optional) 30 mL sugar syrup (you can make this yourself by heating water and sugar with ratio 1:1, or just use cold water and sugar but then the sugar crystals will remain)
- » 1/2 mango
- » juice of 1/2 lime (you can use the other half for garnish if you like)
- » 1/2 red chilli pepper chopped in little pieces (or more if you like a spicy cocktail, and you can also use more for garnish)
- » ice cubes
- » You will also need a cocktail shaker (or some alternative, like a bottle in which you can mix and shake your ingredients).

“ The longer you shake, the spicier your cocktail will get! ”

To make the cocktail, we start by putting the cranberry juice in a cocktail glass. Then you add a lot of ice cubes to the glass, this helps to make a layered cocktail. Make a puree of your mango using a blender. Next, add the other ingredients and some ice cubes to the cocktail shaker (the gin, limoncello, sugar syrup, mango puree, chopped pepper, and juice of half of the lime) and shake it! The longer you shake, the spicier your cocktail will get! After that, you pour the content of the shaker in the glass, and do this carefully! That way you will get a layered cocktail. Next you can add some garnish, and then you are done! Now you have a cocktail that looks like fire and also tastes like fire, enjoy! :D



We also have another very special drink for you, again in the fire theme! This flaming shot is very sweet and more for those who only like the look of a flame.

**YOU WILL NEED THE FOLLOWING
INGREDIENTS FOR A 50 ML SHOT:**

- » 10 mL grenadine
- » 15 mL rum
- » 15 mL orange juice
- » 5 mL very strong liquor

To make the shot, add a layer of grenadine to your shot glass. Then mix the orange juice and rum together. Using the back of a small spoon, add the mixture to the grenadine, creating a faded layer. Lastly, again using a spoon, top it off with a little bit of your strong liquor. We used Stroh 80 for this, but you can use anything that contains more than 50% alcohol. Now take a lighter or match and light your shot on fire.

Bottoms up! Love, ATHENA



| infimum: A strange or funny quotation from a teacher, a student or faculty member.
Here you can find infima sent to the Supremum committee via inf.gewis.nl.

Irne: "Heeft papa de Nooij in Delft gestudeerd?"

Random voorbijganger tegen het voltallige 39 bestuur in Peach shirts op koningsdag: "Beetje te hard gewassen of niet?"

Wouter: "Wat is -1 * -1?"

Koen, alwetende CO der GEWIS: "+2"

Jealy: "Irne, navigeer je nog?"

Irne: "Nee, maar we gaan nog goed!"

Romy's schoen wordt uitgetrokken

Romy 3 uur later: "Waarom heb ik een schoen niet aan?"

Sanne de W.: "Ik heb niet eens twee minuten nodig, Rink. Ik heb genoeg aan 20 seconden."

Evie omschrijft zichzelf: "1 meter 60 pure intimidatie"

Max: "Twee vijfen is vijf slokken drinken. Twee zessen is zes slokken uitzdelen."

Noa: "En twee zevens?"

Anouk O.: "Ik val wel heel erg op buiken."

Bouke tegen Bas: "Als je Irne gebruikt dan lijkt alles altijd langer..."

Anne: "De grens tussen lovend en iemand seksueel aantrekkelijk vinden is zo klein..."

Random dude over Ilse: "Jooo, is ze lekker?"

Jelte: "Tja, ze komt uit Groningen."

Random dude: "Oh ja, laat dan maar."

Wouter van der H.: "Sjoerd zit toch bij ATHENA?"

Jealy: "Van welk land is deze vlag?"

Irne: "Gelderland"

Steven: "Ik ben op zoek naar een naam die een beetje debiel is, maar ook schattig."

Kostek: "Zoals Naomi!"

Naomi: "Ik ben niet schattig!"

Alex: "Als je het zekere voor het onzekere wilt nemen zou ik maar wel gewoon jezelf verhongeren."

Roy: "We moeten dat steegje in waar die vrouw uit komt!"

Irne: "Dat is m'n schoonmoeder!"

Rink: "Word ik belachelijk gemaakt?"

Eline: "Nee, alleen je persoonlijkheid."

Teacher: "Complexity theorists are just like children: they read too much fairytales."

Suus is stoned: "Ik snap echt niet dat mensen die stoned zijn gaan rijden."

Noa luisterend naar een nummer van Louis Armstrong: "Waarom klinkt dit als de Muppets?"

Merel: "Ik wil terug naar de hoeren."

Wietske: "Ja de 80-jarige oorlog, dat was toch zo met Spanje en Willem van Oranje en Maarten Luther King!"

Wouter vlak voordat het bestuur naar 'via' gaat: "Wie is Gerben überhaupt?"

Wouter: "Als hij Rink Pieters had geheten dan had je het wel onthouden."

Rink: "Klopt, maar er bestaat wel een Jan Pieters."

Sanne: "Ja ik heb dus echt geen Flugel-neus, Ada Lovelace wel!"

Max gooit alle bierflesjes om

Bas: "Yahtzee!"

Max: "Waarom spelen we opeens bingo?!"

Roy: "Ik kijk niet echt naar Lubach, maar die van gisteren keek ik wel."

Max: "Maar je was toch vorige week gestopt?"

Roy: "Dat klopt, ik heb eigenlijk alleen die van vorige week niet gezien."

Leon: "Hoe heet dat ene nummer van Carly Rae Jepsen met die zeehond met saxofoon?"

Om 2 uur 's avonds

Noa: "Je hebt mijn chocola opgedronken. Oh nee wacht, mijn ijs opgegeten!"

Chiel: "Ja duidelijk, het lampje brandt niet dus er is geen stroom. Er is ook geen lampje maar dat maakt niet uit."

Eline vertelt over d'r boete voor te hard rijden.

Sanne de W.: "Kan je een boete krijgen voor te hard fietsen?"

Aimee: "Gewoon Lieke met een L toch?"

Max: "Ik ben geen aardappel, houd je bek!"

Roy: "Pils bij m'n scouting was 75 cent."

Max: "Bij GEWIS was het minder."

Wouter: "Ik weet echt niet meer of het meer of minder was bij GEWIS."

Twan M. tegen Dylan ter V. tijdens het spelen van cookie clicker: "Oeh ja snel, steek hem erin! Ik heb een lucky!"

Ilona: "Pattern hebben ook allemaal technische mensen met computers enzo."

Samuel: "Steek hem in het gat is alleen duidelijk als er maar één gat is."

Koen: "Ik ben perscotariër, ik eet niets en kijk alleen naar persconferenties."

Anne tijdens Kascovergadering: "Ik ben niet zo van het tellen."

Irne maakt een poll voor zoekmachines.

Jealy: "Doe niet DuckDuckGo als optie, want dadelijk stemmen mensen daarop."

"Over babys maken met twee mannen."

Noa: "Kan je niet gewoon het sperma halveren en dan samengooien?"

"Over het 40ste kandidaatsbestuur."

Max B.: "040 betekend ook gewoon wiet. Onee dat is 420."

Robin: "hij is niet te dik, ik kan er gewoon nog aan zuigen."

Pim: "Even een vraagje aan 40..."

Jealy: "Wie is 40? Jij Pim?"

Jealy: "Ik wil echt een foto voor onze servers. Dan lijk ik net een hacker!"

Roy: "De BV gaat echt heel efficiënt.."

Irne: "Ja, en door wie komt dat?"

Leon: "Ik was het laatst door Rink verrast toen hij bij me in bed kwam liggen."

Rink: "Hoezo verrast, het licht stond gewoon aan!"

Wouter van H.: "Uit het hart, uit het verstand, ofzo."

Leon en Rink in koor: "Uit het oog, uit het hart."

Wouter van H.: "Maar er is er ook eentje met verstand... Of haal ik nu een Bløf-nummer erbij?"

No one: " "

Literally no one: " "

GEWIers when inf.gewis.nl breaks: "CBC tis stuk!!"



STAYIN' LIT

HOW THE WEB COMMITTEE KEEPS THE FIRE BURNING AND PREVENTS OUTBURSTS

Maintaining an old software project sometimes feels like going through one of Dante's circles. Extinguishing the flames would, however, be far more detrimental than you might think. Many people rely on the website, and they do not care about the fire in the deeper circles. Like Prometheus, we must learn to control it rather than to fear it. Not only do we need to apply patches and updates, but we are also consistently adding new features that may complicate the overall project even further.

TEXT Koen Teewen and Tom Udding - Web Committee

FROM INCEPTION TO PLAN

Some of these new features are born out of our own creative thinking; others are suggested to us by individuals, other committees, or the board. Wherever an idea has its origins, it is always important to consider whether it actually fits in with the rest of the project, whether it is realistic, and whether we should adjust the idea after looking at it from several perspectives. Implementing a new phenomenal photo viewer was the idea of one of our members; adding labels to jobs was proposed by the board, and completely reworking the activity module was an idea that required meticulous planning. The necessity for an administrative interface, proper data protection, maintainability, extensibility, and convenience are things to consider, amongst others.

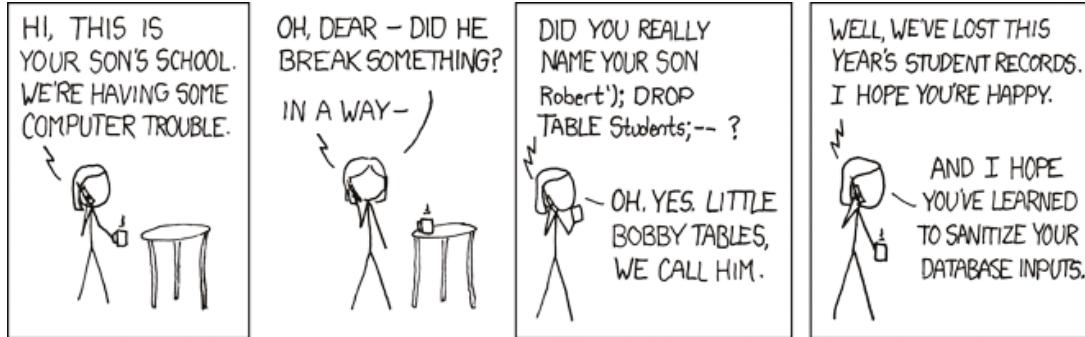
Whatever it is you want to do, it is always important to first make an inventory of what needs to be done and to ask yourself whether you know how to do these things. Possibly you can already put something you learned during one of the courses you took into practice. Otherwise one of the other members may be able to help you make improvements to your plan. We all have sufficient experience with web development, but each member has their own skillset which may complement what you are trying to do. Is your plan a bit too ambitious? There is no need to tackle something on your own: ask someone to work together. We are a

team after all! Once you have taken all necessary information into account, you can continue with the next step.

TAKING IT TO THE WORKBENCH

For this step, you will require some coffee – or a beer as some of our members prefer. Starting from our current production image, you start making changes according to the plan you devised. You try to make small adjustments to eventually reach your goal and check your progress several times along the way. A minor mistake, like a missing semicolon, may cause the website to break. We all know it's easier to find a needle when the haystack isn't that big yet. Each time you make a change that works, you feel satisfied with the progress you have made.

Now that you got something working, it is time to polish it so that the real beauty of what you did can step into the daylight. You will probably want to go with a cappuccino for this step. Code quality improvements, testing for mobile devices, looking for edge cases, and taking more user perspectives into account are all part of this phase. Once you are happy with your conception, it is time to let your peers have a look.



ADDING WOOD TO THE FIRE WITHOUT LETTING THE FLAMES GO TOO HIGH

One of your buddies will now pick up where you left – or perhaps you are looking at his work. First, it is necessary to look at what changed and what was planned to change. Did you forget to change something that should also be adjusted to the changes you made, or did your changes have adverse effects on other components that you did not take into account? Edge cases are something to consider here as well. It is important to not only consider the average user but also your friend's grandmother and even a potentially malicious user that does not use the website as you intended; the user who always tries to access pages they are not supposed to see or the one who has a Little Bobby Tables.

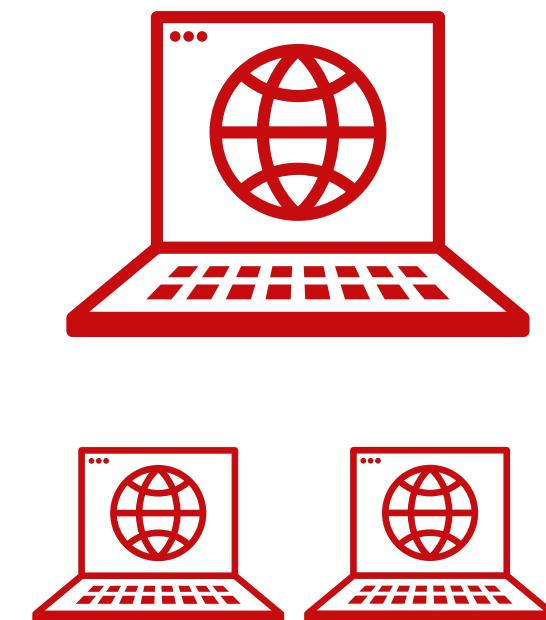
Based on the feedback that you receive, you go back to the workbench to polish your work some more. It is normal that you do not get everything right after the first attempt. Two pairs of eyes always see more than one. This step is crucial because when you add wood to the fire, you want to know what happens to the fire. Next to the manual review and tests that we do, automated tools are there to help us do this efficiently.

SHARING THE SUCCESS

You may feel happy already now, but as Frank Sinatra once sang: "The best is yet to come". Once your new or improved feature has been successfully reviewed, it can be incorporated into our production image. Once this is deployed, everyone will be able to enjoy the

fruits of your accomplishment. This is your moment to shine and be proud of your work.

In case something was missed in the polishing or review phase, you may need to go back to the workbench as well. The many eyes that will look at your work may still find room for improvement. The Web Committee would like you to share your success with us. Experienced or inexperienced, we are always looking for new members who share the same passion for technology as us. Reach out to one of our members in case you are interested in creating your own success story!



DATA CUSTODIAN BIJ DE BELASTINGDIENST

Na mijn studie hogere informatica ben ik aan de slag gegaan bij een kleine uitgeverij. Daar ontwikkelde ik vooral websites. Na verloop van tijd kreeg ik er steeds meer taken bij, zoals het schrijven van offertes. Zo'n breed takenpakket beviel me eigenlijk wel; zo kon ik blijven groeien. Toen ik op zoek ging naar een nieuwe uitdaging was breedte in werkzaamheden daarom ook een belangrijke voorwaarde.

TEXT Robin (Data Custodian/Privacy Engineer)

NIEUWE PROGRAMMEERUITDAGING

Die nieuwe uitdaging werd de Belastingdienst, waar ik inmiddels alweer 12,5 jaar werk. Ik solliciteerde als developer en omdat er in die tijd veel vraag was naar COBOL-programmeurs ben ik aan de slag gegaan met COBOL. Dat heb ik jarenlang met veel plezier gedaan. Ik heb onder meer in COBOL meegewerkt aan het eerste datawarehouse van de Belastingdienst op het mainframe, waarbij de data in Db2 werd opgeslagen. Daarnaast heb ik meegewerkt aan grote projecten zoals de vooraf ingevulde aangifte en het Enterprise Data Warehouse (EDW), waarbij ik me ook heb omgeschoold tot SAS-programmeur. Later ben ik doorgegroeid naar de functie van Bouwcoördinator; in die rol heb ik vooral veel softskills opgedaan.

“ Bij de belastingdienst krijg je veel vrijheid om je eigen carrière vorm te geven. ”



BOVENOP DE ACTUALITEIT

Inmiddels werk ik bij de afdeling Data & Analyse. Als Data custodian creëer ik de juiste voorwaarden en omgevingen zodat alle mensen die met data moeten werken – de Data scientists, Data-analisten en Analytical programmers – hun werk kunnen blijven doen. Hierin werk ik veel samen met de Data steward die het contact met de interne klant onderhoudt. Ons vakgebied is erg actueel en in ontwikkeling. Denk bijvoorbeeld aan de privacyverordening; daar komt veel nieuw werk bij kijken. Juist dat maakt werken bij Data & Analyse zo leuk.



VAN DATA CUSTODIAN NAAR PRIVACY ENGINEER

Momenteel ben ik me aan het ontwikkelen van Data custodian naar Privacy engineer. Hiervoor volg ik een aantal opleidingen en cursussen waar ik veel tijd en ruimte voor krijg. Bij de Belastingdienst zijn de ontwikkelmogelijkheden sowieso heel goed; je krijgt een persoonlijk opleidingsbudget en soms is er ook een afdelingsbudget dat wordt ingezet om de kennis en kunde van mensen afdelingsbreed up-to-date te houden.

“ Als Data custodian heb ik een breed takenpakket en veel verantwoordelijkheid. ”

Als Privacy engineer ga ik awareness creëren over hoe je veilig met data om kunt gaan. Dat betekent veel overleggen en mijn kennis delen door veel te presenteren. En dat is soms best complex omdat je hier en daar ook wel stuit op wat gezonde weerstand. De data scientists willen gewoon lekker hun werk doen en natuurlijk niet te veel geremd worden door wetgeving, maar die grote verantwoordelijkheid hebben we nu eenmaal.

NIEUWE PROGRAMMEERUITDAGING

Toen ik bij Data & Analyse kwam werken, heb ik een assessment moeten doen. Daaruit bleek duidelijk dat ik continu uitdaging nodig heb om mijn werk goed te kunnen doen. Gelukkig zit dat bij Data & Analyse wel goed. De vrijheid in ontwikkeling, de grote hoeveelheden data en de verantwoordelijkheden die daarbij horen, zijn voor mij belangrijke ingrediënten om bij de Belastingdienst te blijven.



Belastingdienst

HOW TO MATHEMATICIAN?

Do you have the feeling that nobody understands you? That your proofs are not taken seriously by the establishment? That academics are not willing to hear your ground-breaking ideas? If the conventional paths of mathematics are not for you, then we can help you to see the truth.

TEXT GEBEP

We as GEBEP (GEWIS Borrows Euler's Proofs) have adopted the truth and now we see the world as clear as Euclid saw it himself. Looking back, we cannot understand how we kept our eyes closed for so long. Even within GEWIS, we see that a true understanding of mathematical concepts has ended up on the lower shelves. As GEBEP, we want to help you become enlightened. Do away with the sheep of modern mathematics, open your eyes and face the truth.

“ ...we see that a true understanding of mathematical concepts has ended up on the lower shelves. ”

10 STEPS FOR BECOMING A ‘CRACKPOT’ MATHEMATICIAN

1. CONSTRUCT AN ORIGIN STORY

To distinguish yourself from the plain, uniform mass of cookie-cutter mathematicians, you require a compelling origin story that encapsulates the birth of your brilliant mind. Every self-respecting pursuer of truth has an origin story. Recall Gauss, who as a kid outsmarted his insipid teacher when he was tasked with the addition of a sequence of numbers. Her feeble mind could not comprehend his infant genius and she was flabbergasted when he solved the problem in a matter of milliseconds. Devise a backstory in which

you, as a mere young child, solve a long-standing open problem of mathematics, tracing the Fano plane with your finger on the fogged windows of a crowded train. Expound in detail the wide-eyed amazement of the crowd, and how everybody clapped.

2. DENOUNCE THE ESTABLISHMENT

The complacent cartel of academia is forcing their depraved and derelict views upon the masses. You must break from your chains and denounce these criminals. It is time to reclaim your freedom of thought. Do not accept their work. Reject their so-called ‘proofs’. Openly speak out against these evil-doers, expose their malicious mathematics. In order to fortify your stance, it may be useful to insult an entire nation at once. For example, claim that the Greeks have achieved nothing since Archimedes got out of his bath.

3. BREAK WITH THE ESTABLISHED VIEWS

After you denounce the cartel, you have to reject their results. The notion of infinitely divisible real numbers is truly ridiculous, as is the idea of a never-ending number line. I have never heard someone count to infinity!

4. DO DRUGS FOR INSPIRATION

It should come to no surprise that the academic cartel of mathematics has close ties to the medical cartel. They will undoubtedly deceive you into thinking that consuming mind-enhancing research chemicals is bad for you, when in truth it allows you to use one hundred percent of your brain capacity. Even the great Paul Erdős did methamphetamines to let his mind escape from his mortal restraints.



5. CREATE YOUR OWN MATHEMATICS

Now that you have exposed the holes in the modern mathematical understanding, you need to bless the world with your own intelligence and come up with explanations that actually do make sense. Come up with a theorem and a proof, or even better, come up with an entirely new field of mathematics. Follow in the footsteps of Mochizuki, who broke the foundation of mathematics with his inter-universal Teichmüller theory.

6. ENRICH YOUR LANGUAGE

You are burdened with the arduous task of conveying your brilliant ideas to the sleeping public. In order to accomplish this, it is necessary that you adopt a richer language, which suits the greatness of your ideas. Refer to your work as 'unravelling the secrets of the universe' and leave no doubt that your findings are of a divine nature. To mathematically express yourself, you should use the only respectable language and notation in science: Category Theory.

8. CONNECT WITH OTHER INTELLECTUALS

Connect with other keen minds on online fora, and exchange ideas with gifted individuals. The internet is the only place where you can think freely and speak out without being oppressed. One address for such gatherings is Quora. This website is home to a large community, in which the average IQ is at least 160 (probably more). You will feel comfortable among these brilliant people.

9. BUILD YOUR OWN WEBSITE

You have the ideas, you have the proofs, you have mastered the language. It's time to publish. Of course, all the mainstream journals will be too timid to accept your revolutionary findings, because it does not align with their short-sighted world views. It is better to take matters into your own hands. The best way to propel your results into the wide world is to build your own website. Any respectable mathematician in this day and age should have a website.

10. DIE UNRECOGNISED

The final purpose of being a great artist is to die without recognition. Do not despair if your work is not understood within your time; this is only a testament to your genius. The quality of your work will triumph, even if it is a matter of decades or centuries. Cantor was ridiculed by idiots during his lifetime, but his legacy has blossomed and we all know now, what a genius he was.

“ The internet is the only place where you can think freely and speak out without being oppressed. ”

Congratulations, you are now officially a 'crackpot' mathematician. You are a fierce warrior on the front lines of truth. You are fighting alongside Pythagoras, Euler and Newton in the war of enlightenment. In unrecognised death, you have ascended above your peers, who will be forgotten today sooner than tomorrow.

You are staring directly at the face of God, and rank among the greatest minds of the universe. For such an Einstein, there is only one right place to exercise their brilliance: GEBEP organises fun mathematics competitions every year for all students of GEWIS. We hope to see you there, and we will make sure to provide some challenging and thought-provoking problems. We are excited to see the wonderful solutions that you come up with.

FALCON ELECTRIC AVIATION

| Flight schools in Europe alone are responsible for 75 million tonnes of CO₂ emissions every year. This is the number which we, at Falcon Electric Aviation, aim to curtail. Falcon was founded in 2019 and is a multidisciplinary team of students who aim to convert already existing aircraft to electric-powered ones. Our team currently consists of 13 students from over 6 nationalities! The structure of the team is as follows: We have a board consisting of 5 roles, 4 of which are filled (so if you are looking for a fun and educational opportunity, you know who to contact!). The technical team consists of an electrical and a mechanical department. Finally, we have the PR/business team.

TEXT Danielle Gillam

We decided to convert aircraft, rather than design our own, in order to reduce the waste created. Additionally, using already existing aircraft cuts down the time of the electrification process drastically, as in aviation there is a long list of rules, regulations, and certifications that the plane must adhere to. In existing planes, most of the design features are already certified.

We focus on flight schools for a number of reasons. Firstly, as already mentioned, flight schools are responsible for a massive amount of CO₂ emissions yearly. Secondly, due to the limitations of battery technology, electric flights can last approximately 1 hour. This would not be feasible for long-distance flights, but this is how long a typical training flight lasts and so it is a perfect application. On top of this, the aircraft spends a lot of time on the ground in between flights which offers an ideal charging opportunity! Electric aviation will also reduce the costs of flying greatly, as there are fewer moving parts in an electric aircraft compared to a traditional plane and, therefore, less maintenance is required. Fuel in traditional aviation is also expensive, which is no longer the case after the conversion. These cost reductions will hopefully make flight training more accessible to those who wish to learn.

We are currently working on our first project: converting a Cessna 150, which is one of the most prominent flight

training aircraft. The aircraft conversion process majorly includes replacing the fuel engine with an electric motor equivalent and replacing the fuel tanks with batteries for energy storage. The electric motor equivalent must mechanically satisfy all the specifications required to fly the plane in all the environmental conditions specified by the vehicle manufacturer. The engine also provides power to other systems like the cooling systems or hydraulic systems for landing. All these systems need to be replaced by an electrical equivalent too. Then, the hunt for the perfect battery begins. The voltage of the battery depends on the main motor controller and motor specifications. The capacity of the battery needs to be calculated based on the expected flying range. All of these modifications need to be done without exceeding the full take-off weight of the plane.

Right now, we are entering the component testing phase of our project. This phase is extremely important as, in order to obtain a permit to fly, every component must be fully tested and certified. At the heart of component testing, there is a lot of analysis and calculations, which is an interesting opportunity for any interested mathematician, data or computer scientist!

“HI EVERYBODY,

And welcome back to yet another episode of the daily audio log! Today it is April 19, 2021, and I have a lot of things on my plate. Let me explain what is going on! First of all, I ...”

TEXT Erik Takke

Habits; they come, they go, and some just stick around. Ranging from small to large, it could be the small dance you do before opening the fridge, blaring completely incorrect lyrics in the shower, or walking around the house on your hands. For me, it is this podcast host act that I have been playing for the past ten or so years. No recording or live audience; just me, my thoughts, and the wind.

I started my ‘daily audio log’ podcast around the age of twelve, after entering high school. Contrary to my primary school, it was situated quite far from my childhood home and required a bike to be reached in a reasonable timeframe. Although friends and classmates would often ride along for the majority of the route, I have completed a significant number of trips by myself. To pass the time, listening to the radio was certainly a good option – mind you, music streaming services weren’t all that commonplace in 2010 – but hearing the same program every day gets boring rather fast.

To spruce things up, I decided to be the radio host myself, and just start talking to myself about nothing and everything. Don’t think I used these talks to dissect some highly intellectual topics; usually, I’d just be mindlessly babbling along what was on my mind. I have ranted about how I wasn’t fairly compensated for working overtime, enumerated all the boring homework things I had to work through later that day, elaborated on what new thing I’d learned about the girl I had a crush on, promoted some fun event my friends and I had planned and complained about the harsh wind I had to fight against at that moment.

It is for the better that I never recorded a second of it: none of it would even come close to sounding like a proper podcast. At times I would hold for a minute so the people passing by wouldn’t hear me mumbling to myself, I’d lose my train of thought halfway through having some discussion with myself, I could hop between seemingly unrelated topics within seconds, or just stop talking altogether if I didn’t feel like talking anymore.

“ ...I decided to be the radio host myself... ,”

All in all, the product would not be anything to be proud of. Heck, some of you might even consider me a weirdo for talking to myself! Yet, I’m very happy with all of the 734 – I’m making something up here – audio logs that I’ve created over the years. Besides simply feeding my passion for talking, it also led me to improve my pronunciation and vocabulary, structure arguments, and observe many inconsistencies in my own thinking. So regardless of how weird your habit is, if it helps you progress your dancing, singing, gymnastics career or just makes you a bit happier about yourself, it is invaluable. Keep it up!

P.S. this is no invitation to lay in bed all day because it makes you feel happy about yourself. You have little time on this planet, so make it count! Set a goal, make a plan, and get started today!





FUTURE-PROOF CRYPTOGRAPHY

The Dutch Science Foundation (NWO) runs a talent program that offers individual grants to talented, creative researchers. Last year, I was awarded one of these grants (called "Vidi" grant) for my project proposal "A solid theory for post-quantum cryptography" which will allow me to establish my own research group. So, what is this project about? Admittedly, the title is a bit cryptic.

TEXT Andreas Hülsing

In a nutshell, my group will provide cryptographic protocols for secure communication that will withstand future attackers as well.

What does this mean and why should you care? If you order something online, contact the municipality, or make a doctor's appointment, you are relying on cryptography to keep your personal data confidential, as well as to ensure that communication data remains unaltered (e.g., the amount of a money transfer), and that you are talking to the party you intended to talk to. Cryptography provides the tools used to secure the connection between your browser and the server of the online shop, municipality, or your healthcare provider. Even if you yourself do not actively engage in online communication, healthcare providers exchange your data online, and the municipality communicates your data online to other public parties like the tax office. Hence, the confidentiality of your credit card data, your registration details, and your health records nowadays depends on cryptography.

0

My group is mainly working on a special type of cryptography that is called post-quantum cryptography (PQC). This is cryptography that withstands attacks, even if the attacker is using a quantum computer. The problem with the cryptography used to secure the Internet today is that it is built on the hardness of solving two mathematical problems: factoring large

composite numbers and computing logarithms in cyclic groups of prime order. Both problems are conjectured to be hard to solve on conventional computers 1 2. Using the best-known conventional algorithms, it would take hundreds of years to break these cryptographic systems even when running a massively parallel computation. In 1994, Peter W. Shor published a quantum algorithm that can solve both problems efficiently, i.e., in polynomial time. On a sufficiently large quantum computer, we could break today's cryptographic systems in a matter of days using Shor's algorithm. Post-quantum cryptography deals with this problem by constructing cryptography based on mathematical problems which are conjectured to be hard to solve even for such a quantum computer.

What I have been doing so far is developing ways to turn such (supposedly) hard, mathematical problems into cryptographic systems, and proving that breaking the resulting system is about as hard as solving the mathematical problem. Having this kind of proof has the advantage that we do not have to cryptanalyze every cryptographic system that we develop. Instead, we can focus all efforts on cryptanalyzing the mathematical problem (and verifying the proofs). An important qualitative feature of such proofs is tightness. A proof is called "tight" if breaking the cryptographic system is as hard as solving the mathematical problem. A "non-tight" proof still



provides a relation between the complexity of breaking the scheme and that of solving the mathematical problem, but the former might still be significantly easier than the latter. Hence, the meaningfulness of a “non-tight” proof is limited.

What does this mean for our cryptographic protocols? The cryptographic systems we design are building blocks from which we construct more complex systems like cryptographic protocols. As an analogy, consider a car. If you have bad wheels, it does not matter how well the body of your car is designed, your car will be inefficient and insecure because of missing traction. With this analogy in mind, a “tight” proof can be seen as a proof that relates to a construction plan for a wheel and states, “if the material used to build the wheel (according to this plan) is of high quality, then the wheel will be of high quality.” A “non-tight” proof, on the other hand, would only state “if the material is of high quality, then the wheel will be of some quality.” You might therefore have to spend a lot of money on the finest rubber and metal, just to have a guarantee that you get a somewhat decent wheel. This can get really costly and the same happens for cryptography. A “non-tight” proof forces us to pick larger parameters which slows down the cryptographic system and increases the size of keys and the data that has to be sent. Therefore, cryptographers that care about provable security put a lot of effort into finding a proof that is as tight as possible.

A very challenging aspect of security proofs in post-quantum cryptography is that these proofs must account for the possibility that an attacker could be a quantum algorithm. On a technical level, our security proofs consist of writing an algorithm (called a “reduction”) that solves the mathematical problem using an attacker against the cryptographic system as a subroutine. When this subroutine suddenly can be a quantum algorithm, many of our traditional proof techniques fail. In the first part of my Vidi project, my team will develop new techniques that allow us to achieve tighter proofs for such scenarios in which our traditional techniques fail.

In the second part of the project, my team will work on constructing new, post-quantum secure alternatives for the cryptographic protocols that we use today. This encompasses most importantly TLS and VPN protocols but also protocols that are for example used for private messaging where additional privacy requirements must be considered. A major challenge here is that we currently do not have a post-quantum plug-in replacement for the Swiss army knife of cryptographic protocols, the Diffie-Hellman key exchange **3**. This makes it necessary to redesign protocols using other cryptographic systems. Coming back to our car analogy: If all your cars are designed for wheels with four bolts but all wheels that you can buy need five bolts, you have a problem.

Like for cryptographic systems, the aspect I am most interested in is security proofs. I will deliver proofs which show that violating the security guarantees of these protocols is as hard as breaking the cryptographic systems that are used in the protocol. What we are looking for is a recipe that tells you how to turn a conventionally secure communication protocol into a post-quantum secure one. The tricky part is to do this in a way such that the security proof also translates to the post-quantum setting.

The long-term goal is to combine the results from both parts to obtain protocols where security can be tightly linked to the hardness of solving supposedly quantum-hard mathematical problems. With such protocols, we can be confident that our data will remain secure also in the future. Along the way, there are many open problems on the intersection of quantum algorithms, complexity theory, and cryptography. I am looking forward to solving some of them over the next five years.

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And of course: If you send your data confidentially to an adversary instead to the intended recipient, you did not gain anything. Hence, it is also crucial for data security to ensure that you talk to the right server.

1

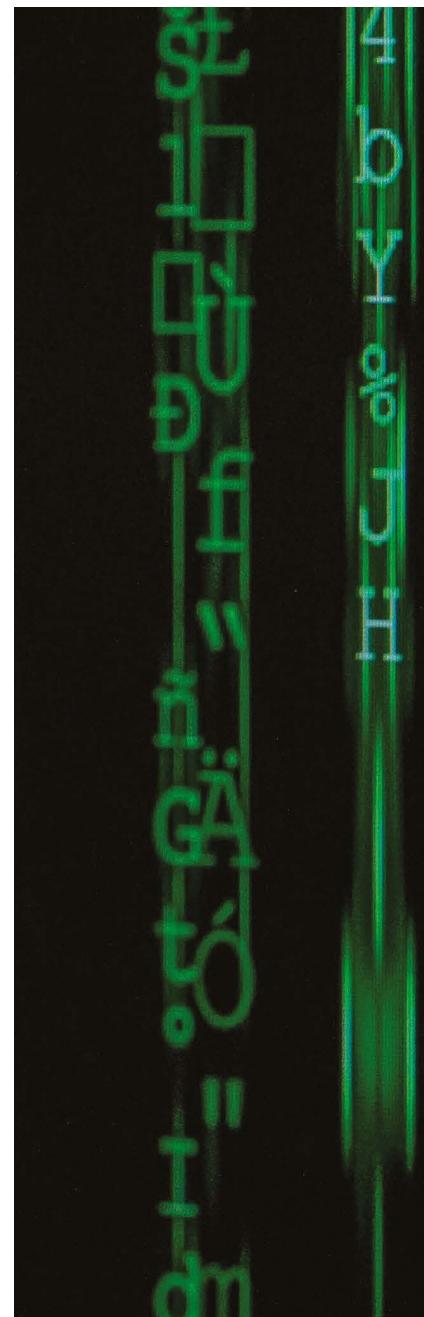
Formally, a problem is “hard” if it takes at least super-polynomial time to solve it.

2

Conventional == non-quantum

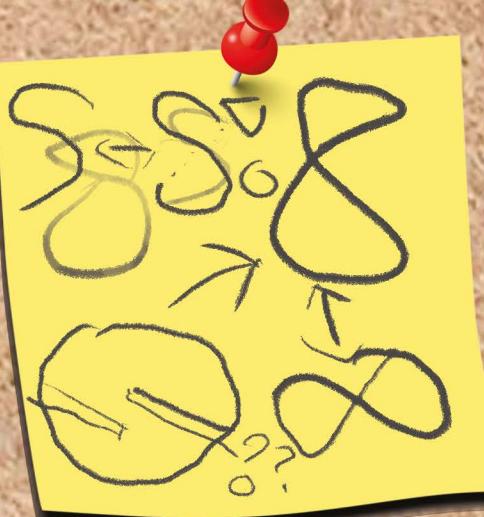
3

This is only half the truth. There is actually a proposal from our own Tanja Lange and Lorenz Panny called CSIDH but the security of this proposal is still a topic of dispute.



LUSTRUM 2021

This year is going to be great for so many reasons, but of course the most important of those reasons is we'll be celebrating GEWIS' 40th birthday! As the mathematicians will have already calculated by now, 40 is a multiple of 5 which means that this year is a GEWIS lustrum year. As it will be the 8th GEWIS lustrum, we as a lustrum committee are planning on organizing 8 amazing activities throughout the year, along with some extras such as a limited edition clothing line. As you may already have heard, the theme of this year is Infinity (which is an 8 flipped on its side, for those who haven't noticed yet). Earlier this year we received a mysterious drop of craft beer, and since the deliciousness of this beer knows no bounds, we are keen on traveling beyond the limits of the known universe to find out where it came from!. Unfortunately we still lack some knowledge on what infinity truly means, and perhaps more importantly: We have not yet finished building a (safe) spaceship... Make sure to check our website (lustrum.gewis.nl) for updates on the story!



Joseph Wolff ► Q's #1 No freedom Fighters

Today at 19:41

What do they think.... That we believe this beer just fell down .. out of NOWHERE? When will the government see that the people are done. It could not be more obvious what they are trying to do! First the vaccines, now "beer"... Hugo de Jonge trying to oppress us.. Cuck. We are awake and not asleep, we are SMART! No way I'm paying for this, my tax payer money!! They are not touching my family, I will protect them from the government trying to steal from us. It won't be long until the sheeple wake up and leave the herd, the truth always comes out.. the dictators need to go . The government cannot oppress us for infinity. Bye bye big Brother Ja

Like

Comment

Share

David and 27 others

The New Daily Times

Tuesday, June 29 2021

MYSTERY CONTAINER OF BEER FALLS DOWN FROM SKY



Area residents of Eindhoven, a small town in the Netherlands, were astounded when a large, unknown object suddenly fell from the sky. "I just happened to be walking my dog when it came down, completely out of the blue. I am just glad that nobody got hurt," an eyewitness reports about the incident.

Officials from the region have identified the object as a container full of beer, and have taken samples for investigation. The large remainder of the beer was claimed by students from the GEWIS Lustrum Committee. Those who have tried it, declared that the beer tastes infinitely delightful. Nonetheless, the drink is

shrouded in mystery, as they were unable to liken it to any beer on the market.

The unknown providence of the beer has led to heavy speculation among Eindhoven residents. Multifarious claims have been made, ranging from divine intervention to extraterrestrial life, although none seem to be backed up by solid proof. Turn to pp. 14-15 for exclusive interviews with the people that have already tasted the beer, which surpassed anything they ever had before.

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Ministry of the Interior and Kingdom Relations
P.O. Box 20010
2500 EA The Hague

Dear [REDACTED],

[REDACTED] has requested I contact you with the utmost urgency. Today at approximately 16:00 an Unidentified Object has descended to earth at 51°26'49.8"N 5°29'05.5"E. Initial reports state that the UO contained a notable quantity of alcoholic liquids of unknown origin, leading to the preliminary conclusion that it was an undocumented marketing stunt.

However, after inspecting satellite imagery for [REDACTED], it has become apparent that the UO had been descending from beyond the earth's exosphere. [REDACTED] managed to confiscate a sample, and it has since then been thoroughly examined. Initial lab results show no sign of any harmful components and the liquid has been deemed safe for human consumption. Additionally, the liquid appears to stimulate dopamine production in the brain. Intricate analysis of the liquid, however, has found traces of supertemporal components. The UO may therefore originate from a period in time for which no proof of life has currently been found and its lifespan may exceed the known age of the universe. We have updated the status on the UO to [REDACTED] and have increased priority on project [REDACTED].

With our current trajectory, [REDACTED] is set to be completed by [REDACTED].

With regards,
Special Agent [REDACTED]

Readers' contributions

Hey guys! This might seem a bit weird or nerdy (I'm proud to be a geek though haha!), but I've been hobbying around with my homemade radio and I noticed some weird number pattern just the other day. The signal was mostly pretty faint; the section in the middle was the only part I received very clearly. I'm a pretty smart guy and 100% sure that the machine is working perfectly, so I think I might have overheard some airline radio chatter but it seems encrypted so it might be MILITARY!! Can my fellow geeks help a brother out and see if they can decrypt it? Contact me at lustrum@gewis.nl with the answer and I might treat you to one of those cool new GEWIS lustrumbeers! Freddy out.

12 22 22 24 0 6 24 1 20 20 22 6 0
9 2 0 7 22 13 14 5 0 24 22 2 11 24
17 14 17 7 0 26 1 15 22 0 17 1 13



Conspiracies, creationism, crates

Analysts have seen opposing theories that lead to a heated debate, especially online. This did not come as a surprise as polarization is among the most researched effects of the internet. If this conversation were to turn into a confrontation, the societal consequences could be disastrous, analysts predict. Luckily, the authorities have been effective in their attempt to avert a major social crisis so far.

A troubling topic is the 'who?'. Some religious movements, with the Vatican spearheading this intellectual legacy, have already claimed the container of beer was sent by God(s). The Catholic Church seems to think this is the validation they have been waiting 2000 years for.

This is in conflict with the verdict of the majority of the scientific community as some science institutions have attributed this event to other lifeforms. To illustrate the variety of theories gaining traction; the Facebook group 'Kubrick Geeks' which gained 54 million followers in two weeks, attributes the event to a godlike-alien civilization by drawing parallels with Arthur C. Clarke's '2001: A Space Odyssey'.

Others disregard the entire situation as a 'prank', a phenomenon that is popular among influencers on TikTok these days. It also comes to no surprise that conspiracy theories pop up here and there, mostly accusing the government of malicious intent.

While a lot appears to be unclear at this point in time, we know one thing for sure; the beer-like substance, which seems to be the primary content of the container, is said to taste superb. Unfortunately, there is only a limited amount available and it is therefore crucial to make an effort to hunt down its recipe. This calls for a journey into the infinite stars.

Michael Persson
is redacteur van de Volkskrant.
groen@volkskrant.nl

WORKING ON PROJECTS AT WITTEVEEN + BOS

TEXT Luke Moth, Data Specialist Witteveen+Bos

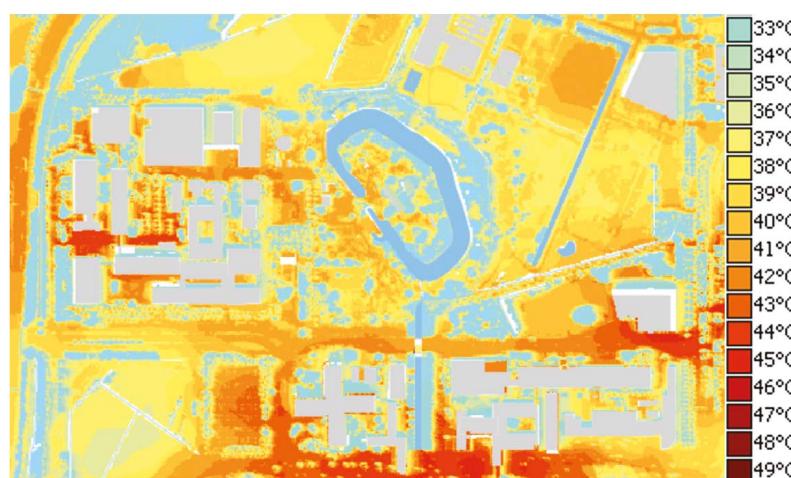
After finishing my degree in physics I found myself within an consultancy and engineering firm. Approximately two years ago, I made a switch to Witteveen+Bos and since then I am working quite happily from the office or, more recently, home. As a consultancy and engineering firm, we advise and assist our clients worldwide in solving the complex challenges of our time and are a committed partner for our clients. Witteveen+Bos employees work on more than 4,000 projects worldwide on issues such as CO₂-neutral and circular construction, sustainable infrastructure, energy transition, flood protection, climate adaptation and the improvement of industrial processes.

I am a member of the data-analysis group and within this group we receive a diverse set of questions and work on a diverse set of projects. Data can be quite a vague definition, though this is exactly what all the projects we participate in have in common. In practice we usually receive a large set of data (so let us say, not easily organized in excel - though people still tend to try this) and a request to validate, analyse or visualise this dataset. An analysis may be anything between a

simple statistical test, any kind of regression, validation with respect to a known (theoretical) model, and/or estimating a forecast. At other times there will be no model available and the task is to find any dependencies in the data using tools like PCA or (other) machine learning algorithms. In this article I explain two examples of projects I have worked on (among others) at Witteveen+Bos, which will hopefully give a nice picture of day-to-day activities.

PHYSIOLOGICAL EQUIVALENT TEMPERATURE (PET) MAP

The first project concerns the development of a map of the physiological equivalent temperature on a hot summer day within the Netherlands. Think of the physiological equivalent temperature as the temperature which a body will 'feel' rather than the actual (air)temperature. This physiological equivalent temperature (PET) includes a wind chill effect, whether the body is positioned on a shady spot, urban heat island effect and many more parameters or effects known to influence this PET. This model was developed by the university of Wageningen and hence it was not our job to create or alter this model, but to implement



this model, validate it, and generate results on a large scale (the whole of the Netherlands) with a high point-density.

Image 1 shows a part of this result. One can see for instance that trees (shade) are relatively cool and that areas between buildings (grey, no data) are relatively hot (because the building block the wind and wind-chill effect). The idea is that citizens and municipalities can use this map to find local cool spots or find and address the local hotspots. Due to climate change the average temperature is rising. Addressing these hotspots results in more liveable cities. The map is publicly accessible, so you can locate the local hot and cool spots in your city.

You can find the full PET map on the following website:
<https://www.klimaateffectatlas.nl/>

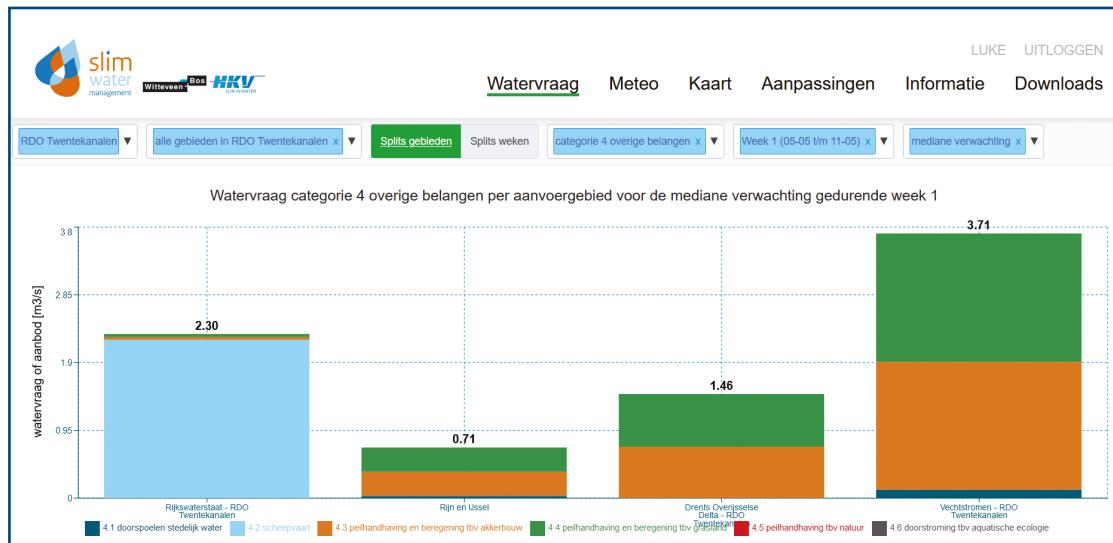
WATER DEMAND

Another project concerns the calculation and visualization of the water demand in several areas within the Netherlands. Dry summers (especially like the summer of 2018) put a high demand on water and in such cases difficult decisions have to be made (in the Netherlands by the water boards) who can get the available water (farmers, shipping, industry etc). The goal of this project was to create a platform which would provide users from these waterboards with a prognosis for the water demand in the next few weeks. This would then support decision-making process

and provide early warnings. Looking at the model and the data this was an interesting puzzle to solve. Several users, with responsibility for unique regions, would like to investigate several components of the water demand which needs to update every day based on meteorological data (and forecasts). We implemented a hierarchical data structure so that for any chosen region (or sum of region), and any chosen water demand component (or sum of these components), the water demand prognosis could be visualized easily. Below is image 1, which is not very readable, but shows the interface for the users. The separate bars indicate separate regions, whereas the colours indicate a specific component of the water demand.

I hope this shows you a bit about the interesting projects that Witteveen+Bos has to offer. In most projects you are working with many colleagues from different disciplines, such as mechanical and civil engineering. So no project is the same and require unique solutions.

Do you want to learn more about Witteveen+Bos? Visit our website www.witteveenbos.com where you can find information about career opportunities and our (digital) business courses.



1

Example of the dashboard user interface for insights on water demand

TRAINING ON PAPER: ONLINE PRESENTING

If you have witnessed a single online lecture you probably know that online presenting is something one has to learn. Most lecturers that can explain topics clearly and in an interesting way in person struggle when presenting from home. Most of us prefer for all our presentations and lectures to be on campus, but it might take a while before that is possible again and even after the COVID pandemic online events will occur every now and then. So what time better than the present to begin learning how to become a pro at online presenting.

TEXT Arend Verbeek

As anyone who has given an online lesson to high schoolers can confirm the most difficult part about online presenting is interaction with the audience. Some people prefer it if everyone in their audience turns on their camera. If people feel like they are being watched they are likely to pay more attention. On the other hand, if people have their camera on they have the tendency to just look at themselves. This can be a distraction. Luckily some video calling programs, like Zoom, allow the user to turn off their self-view.

“ The most difficult part about online presenting is interaction with the audience. ”

The most important thing to remember with online presentations is that the audience will lose focus much quicker than they would in person. When presenting online it is even more important to use tricks to keep the audience's attention. This is why an online lecture is usually way worse than its offline counterpart if it is presented in exactly the same way.

The best way to reset the audience's focus is by switching up the different learning styles used to convey your message. Listening to a person talk is just one learning style and admittedly some people can keep that up for ages without losing focus, but switching up the styles for a moment is easy and doesn't have to take a lot of time. Giving your audience time to think for themselves is a great way to reset their focus. By asking your audience a (rhetorical) question they get a moment to catch up with your train of thought and quick minds will be able to think ahead. This will make your audience excited about what you are going to say next. Just say something like: "what do you think the answer to this would be?" and leave a brief pause before telling them what you found the answer was. Other examples of switching learning styles include: having your audience write down something for themselves, having them share their ideas with other audience members or having them make a quick drawing about the topic. These examples are more applicable to teaching than to presenting, but you get the idea.

“ Give your audience time to think to reset their attention. ”

Another way of recharging your audience is of course by taking breaks and you should always make sure your online presentation is not too long. For normal presentations, the rule of thumb is forty minutes of presentation followed by a ten-minute break. If you are giving an online presentation you should consider breaking up your presentation into even shorter parts.

“ Consider breaking up your presentation into shorter parts. ”

When presenting from home the presenter might also get distracted. Most students don't have studios, but still want to appear professional. Try to make the room you are presenting from as quiet as possible and make sure you won't be disturbed. If you have noisy roommates you can for example put a note on your door. Try to pick a boring background to sit in front of. Posters on your wall or a messy room in the background might distract the audience or make you look unprofessional. In most video calling programs you can blur your background or even turn on a fake digital background. You can use these features if you can't find a proper real background, but some audience members might wonder what you are trying to hide. When picking a digital background choose something serious. There are pictures of the GEWIS room available for this purpose on the site, but they are not always the right choice. If someone is unfamiliar with the GEWIS room these pictures might be strange and a plain background with the GEWIS logo would work better in that case.

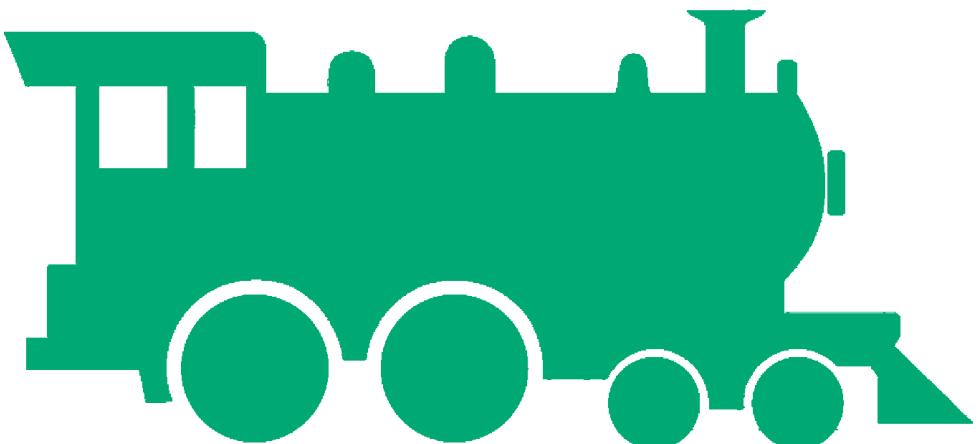
When talking to your webcam instead of an audience it's easier to start talking in a monotone way. Because presenting online is more boring you are probably more likely to present in a boring way. A good trick to prevent this is by imagining you are talking to a good friend. Try to look into your webcam and not on your screen. Act like your friend is on the webcam. This might not be easy at first. You can start by doing this only for the sentences you want to emphasize.

Although you might not be able to see your audience, looking directly into the camera will make your presentation feel way more personal.

“ Try to look into your webcam and not on your screen. ”

Even when using all these tricks some audience members might still lose focus. You can always think about ways to make it easier for those who might have lost their concentration to get back on track. A good trick is to make clear divisions between topics and keep the audience up-to-date on when you're switching to the next topic. Divide your presentation into parts and at the end of one part you can say something like: "This was the first part of the presentation in which I explained why blah blah and now I'm continuing with the second part in which I will show how blah blah and after that, I will tell you something about blah blah". In this way, you can make sure that you and everyone in the audience is again on the same line.

I hope these tricks are useful when presenting online. Some of these tricks are probably also applicable to presenting offline, so keep that in mind. The next time you are following a (boring) online lecture it might even be a fun game to keep track of how many of these tricks the lecturer did(n't) use! Stay safe and have fun presenting!



SUMMER COMES AT LAST

“ *I t is almost summer. We are almost there”. At this point those eight words played in my head on repeat, functioning as a tool to cope with the horrors I witnessed daily. Often I asked myself when would it end, when would this strange and unbelievable reality in which thousands and thousands died end? Lately, thoughts like this kept me awake in the small hours of the night, haunting me restlessly. Especially during nights where I sat behind my old desk, writing name after name in my notebook with nothing but the weak flickering light of a candle to keep me company, these thoughts would drive me near insanity.*

TEXT Filomijn van der Poel

Tonight was one of those nights. The clock on the wall informed me that it was already four in the morning, and although a couple of years ago the streets would've already been filled with the sounds of early workers, right now it was dead silent. A soft breeze slowly redirected my gaze from the ragged notebook in front of me to the opened window to my right, and in it, I could feel the approaching summer. Under normal circumstances, I would have cheered at this feeling, as summer used to be my favorite season. But ever since the sickness came to the city, that had changed. Even the news that all of this might be over by the end of summer had not been sufficient to rekindle the flame that went out somewhere inside of me.

I remember the first day very well. I am a doctor by profession, you see, and I was one of the first to be called out to examine the strange symptoms that over the course of three years greedily took many lives. When I witnessed them then, I would have never dared to dream that they one day would become part of my everyday life. It was a particularly cold evening, which was quite unusual for that time of the year. February had already come and gone, and many inhabitants of the city were getting ready for spring. Little did they know how much different that year was going to be. I remember hastily putting on my winter coat, as the messenger that was sent to get me bounced back and forth from his left foot to his right, impatient and

anxious for me to follow him. My wife managed to sneak a kiss in as I departed with the messenger, on my way to the very first reported case of the mysterious illness. Now, almost three years later, I grinned at my ignorance as I dipped my quill into the jar of ink and went back to writing down names. Just a few more, and then I'd be done. Almost.

Not much later I screwed the cap of the bottle of ink back on, laid my quill to the side, and closed the notebook that I used to record all patients that had been taken by this dreadful disease. For a brief moment I stared aimlessly at the curvy letters on the leather cover spelling “Thomas Johnson”, but as I closed it I noticed that there was only one more page left, and I sighed with annoyance. This meant that I'd have to go out and buy a new one soon. As if I wasn't busy enough tending to my patients, I thought. I sighed once more before blowing out the candle stump on my desk, and in almost complete darkness I found my way over to my bed. As I laid down, I felt all the tiredness and exhaustion of the day wash over me. It brought back memories that I had desperately been trying to suppress for months now. I glanced out of the window once more, the dark grey sky only partly visible from where I was laying. It was a soulless night I thought, as thick clouds passed by and blocked out the last bit of silvery moonlight.

"You don't have to do that, you know", a voice beside me said. I recognized the person who was speaking instantly, but I dared not look over to where the voice came from. A sharp pain shot through my chest, a feeling that at this point was so familiar to me that it almost felt like home. Almost.

"I know. But they deserve to be remembered. They all do. You do", I answered, hating the tremble that was so obviously present in my voice. My breathing became uneven, unsteady. Slowly I felt my limbs go numb, all while shaking and sweating uncontrollably. The voice did not speak again, simply letting me lay there in the dark with nothing but the rapid beating of my heart to interrupt the otherwise perfect silence.

"It hurts", I then whispered, and that was the moment my voice broke. At that moment, lying there in the dark, memories of the past three years flooded my mind, reminding me of the horrors I had seen, and most importantly of the things I had lost. I realized in that instance how done I was with everything. The extra rules, the stress, the deaths, I cursed every damn consequence of this dreadful disease. I felt like screaming at the top of my lungs in the hopes of relieving some of the restlessness and powerlessness that I had been feeling. But I knew it was no use. Nothing could stop these feelings that had haunted me for the past three years.

"I know it hurts", the soothing voice said. "It is only for a little while longer." I wanted nothing more than to believe those words, I wanted the comfort of my wife's arms, to feel her warm skin on mine, knowing that everything was okay. Of course, her words were somewhat true. The city council had announced just a few days earlier than they expected all of this to be over by the end of summer, but a voice inside of me screamed that that was not soon enough. "Don't worry", the voice spoke again. "summer will come. I promise". Those words were spoken with a tenderness and sincerity I could not bear, and for a moment I felt tempted to turn around. I knew what I would find if I did though. I fell for it too many times.

When I woke up the following morning I could no longer remember how long it had taken me to fall asleep. I only knew that I woke up carrying the same tiredness as always, the same weight was resting on my chest, right above the heart. Despite this feeling almost crushing me, I knew I had to go on. I had to get up and face the day, for what else was there to do?

At 8 am I left my room, on my way to visit my first patient. Despite the three years that had passed, it was still quite unnatural site to see the city so empty. Narrow streets and alleys that used to be bursting with life and excitement were now empty, with nothing but the occasional rat or mouse passing by. Of course, it also didn't help that it was a rainy day, with the streets slowly turning into a mixture of cobble and mud. But even on the good days, this was what the city nowadays looked like.

It didn't take long before my cloak and mask were drenched in water. As I caught a glimpse of myself in a puddle, I realized how dumb I looked in my doctor's attire. The long black beak stuffed with herbs looked rather ominous in this weather, and although normally it would have commanded respect, now that it was hanging downwards due to it being soaked by water it simply looked pathetic. I kind of looked like an overgrown raven, almost like an omen of death and disease. I tried not to pay it any further thought as I reached my first patient, a young mother with a child of three years old.

The woman complained of headaches, aching joints, nausea, and vomiting. She also reported strange bumps growing on her arms, legs, and face that were slowly turning a deep purple color. A foul odor came from her body, and despite the strong-smelling herbs in my mask I still smelled it. I knew of course what this meant, I knew that this sickness would develop until the skin turned black and I knew how it would end. As I walked out of the house after having finished the appointment, I couldn't get the image of the woman's daughter out of my head, staring up at me with big, round eyes, and tears building up asking me if her mommy was going to be okay. But neither could I get

the mother's face out of my head, the exhausted look, the black bags under her eyes. I couldn't help but think about how I saw my wife in her, the same defeated pair of eyes, pale face, and hollow cheeks.

Towards the end of my round, the sky started to clear up. I passed door after door marked with red paint, signaling that death resided within those buildings. Somehow that did not stop me from noticing the drastic change of the weather though. There were very few clouds to be seen, and with a strange, peaceful feeling I walked to the edge of the city. Flocks of crows flew up as I opened the graveyard's iron fence, scared off by the sudden squeaky noise of rusted metal. Without really thinking about it, my feet carried me exactly to where I needed to be until I was standing in front of a gravestone. Two years of harsh weather had done a number on the white stone, but the words "Alice Johnson" were still clearly visible. Now that I was here, I wasn't really sure what to say. I reached for my mask, as it seemed indecent to leave it on, and I put it down on the ground beside me. Instead of searching for the right words, I sat down next to the gravestone, leaning my head onto it. Time went by as I just sat there, staring at the grey sky. It didn't matter

that my hands and feet got cold, or that my butt hurt from sitting on the partly frozen ground. Memories of better times, of love, of summer, and most of all, of loss, shot through my mind like bullets.

As I sat there, I saw the sky slowly changing. The clouds gradually disappeared as the sun began setting, making room for a hundred different shades of reds, oranges and pinks to color the sky. For a moment I was absolutely speechless, staring up at the breathtaking sky in awe, watching as a flock of crows flew away into the distance. It wasn't long now before it would get dark. I reached for my mask, trying to make peace with the thought that tomorrow I'd have to live this same day all over again, and as I did, I noticed a strange discoloration on my right hand. I looked at it for a brief moment, dumbfounded and speechless by this discovery, before a feeling of peace took root in my chest that slowly began spreading a warm feeling around my body.

I looked up to the sky and sadly smiled. Summer had come at last.



nfimum: A strange or funny quotation from a teacher, a student or faculty member.
Here you can find infima sent to the Supremum committee via inf.gewis.nl.

Wouter terwijl hij poogt te slapen in het bestuurshok:
"Ze is echt een fucking sportvrouw."

Jasper D.: "Maar het zijn sjaarzen hè, die moeten zich al verontschuldigen omdat ze sjaars zijn."

Ronnie: "Volgens mij ben ik gevallen."

Kijkt naar haar handen

Ronnie: "Oh nee, het was Suus!"

Floris: "Jeffrey waaarom heb jij een kandi-shirt aan?"

Bouke: "Kees gaat de tomatensaus doen... Extra kaas!"

Jasper D.: "Democratie is toch gewoon kut als je eigenlijk gewoon zelf beter bent?"

Roy: "Het is zo jammer als je alleen maar water plast. In Afrika hadden ze dat nog gewoon kunnen drinken!"

Jasper terwijl hij in zijn microfoon fluisterd: "Dit is echt goeie ASML"

Susan: "Ik zit met mijn hoofd in de Chardonnay."

Jasper D.: "Die mannenliefde is echt lekker!"

Anne tells Robin to tell Tim: "Laat Anne stoppen met hijgen."

Anoniem: "Leon is ooit afgewezen in mijn huis, omdat hij te veel GEWIS was."

Pieter: "Man man man, had ik maar borsten. Dan was ik al lang niet meer gestopt."

Houthuijs: "Ik ben heel vaak in de mood om veel te eten!"

Bouke: "We gaan het hier vanavond niet over mannen seks hebben, Willem!"

Tim tegen Willem: "Als wij ooit iets gaan delen zijn het kinderen, maar meer ook niet."

Laura over haar bestuursjaar: "Maar ook dronken kan je heel erg serieuze dingen doen."

Ober tegen Ronnie: "Je bent zeker tweedejaars?"

Ronnie: "Nee"

Ober: "Ben jij ook een feut?"

Irne tijdens de ALD: "Jij hoeft niet te blijven."

Irne draagt een Yankees petje.

Wouter: "Wie is Jan Kees en waarom heb je zijn pet?"

Amber: "Kan je even normaal doen? Oh nee wacht..."

Thijmen: "Soixant-neuf, wat is dat, kan je dat eten?"

Thomas: "Ik praat geen baguete."

Irne: "Ik trok er een beetje aan en er gebeurde niet zo veel."

Jort: "In Nijmegen is het blindenmuseum heel leuk."

Ilse: "Maar je bent toch niet blind."

Samuel valt dronken in slaap om 12 uur, wordt 3 uur later wakker

Samuel: "Ik ben down bad, mag ik hier pitten?"

Gijs: "Het is 3 uur 's nachts pik..."

Samuel: "Dat is een ja."

Er wordt een Tinder profiel van ene Ginn doorgestuurd

Romy: "Ik ga op zoek naar Ton en Nick!"

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VESSEL TRACKING USING MATHEMATICS

Blood vessels, and more specifically the way they behave, are important to diagnose different kinds of diseases. To illustrate this, we assume that we have a patient suffering from diabetes. One of the indicators of this disease is a high tortuosity (a lot of bending) of the vessels in the retina. Therefore, studying the behavior of these vessels can be important to diagnose the patient correctly. As a part of the diagnosis process, we assume that the doctor took a picture of the patient's retina. It will be very convenient when there exists software that automatically indicates where the blood vessels are located and which is able to track them in the image. But how do we do that? The Applied Differential Geometry group in our department does research on different topics including vessel tracking. Under the supervision of Remco Duits and Bart Smets, I contributed to this research. In this article, I will try to give an impression of this research project.

TEXT Nicky van den Berg

First, we give a short theoretical background. It is important to note that images consist of pixels. Each pixel has a color value, either in RGB or in greyscale. This means that we can see the 2D-image as a function on \mathbb{Z}^2 . Every image in RGB can be converted to an image with greyscale values. Then, every discrete location contains one value in the interval $(0,1)$, where 0 and 1 represent black and white respectively.

There are different ways to track blood vessels in images. One of them is by lifting an image to a so-called "orientation space". This means that we calculate the alignment of the structure with a specific direction. We choose these directions beforehand and, under normal circumstances, we define the angles uniformly over the interval $[0,2\pi]$. This is called the left-invariant frame. However, not all line structures are parallel to these predefined angles. Therefore, it may be interesting to take a look at linear combinations of the different vectors in the left-invariant frame. These linear combinations are calculated such that the result is optimal. The new frame we construct this way is called the gauge frame.

Once we have determined the frame in which our calculations should take place, we can start calculating the distance from a given seed to each point and orientation in the orientation space. We do this by solving a partial differential equation. Once all the distances have been calculated, we determine the shortest path using Newton's steepest descent algorithm.

Usually, when someone asks you to calculate a distance, we choose the Euclidean distance. That means that moving in all directions costs the same amount of energy. However, in some circumstances, we want to make it harder to move in one specific direction compared to the other directions. This can be illustrated by an easy example. Imagine that you have to walk from the Markthal to GEWIS. You can either use the stairs or the elevator to go to the third floor. In the first case, it costs more energy to move upwards for 2m than it costs to walk 2m to the left while you stay at the same level. In the second situation, it costs less energy to move upward, compared to sideways movement. This might suggest

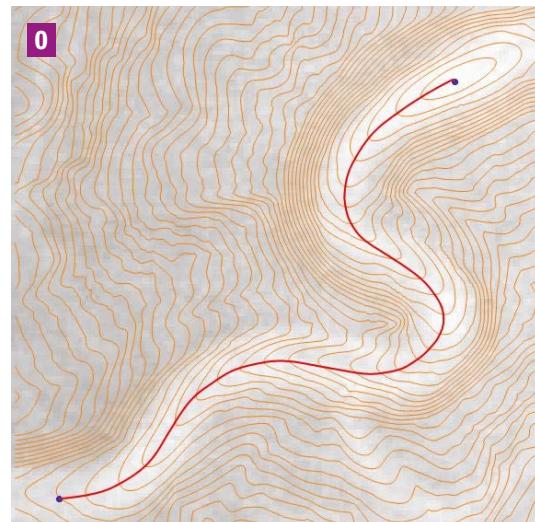
that it should be cheaper to move up and down, whereas it is "hard" (or expensive) to move sideways. We can implement both examples, and even more, by adapting the norm (or metric) that we use to calculate distances. Similarly, we can make changes to the metric that ensure that you can only move forward (walking backward is very expensive). All these changes in the metric also influence the expression we use in Newton's steepest descent algorithm. Therefore, it is important to ensure that the directional derivative changes in correspondence with the used metric.

When tracking a blood vessel, we can identify different properties which these vessels (and the corresponding tracking) satisfy. The first important property is that the tracking should not change when we rotate the image. We expect that the result of the tracking of a rotated image is exactly the same as the original tracking. Secondly, we note that vessels do not make very sudden angles. We visualize this as if a car is following a vessel. The car can move forward, but when the vessel makes a sharp turn, the car should not have to use its reverse gear; the blood in the vessel should not have to move backward in order to be able to travel through the vessel. Lastly, we assume that a vessel has the shape of a thin cylinder. Therefore, when we define the metric, we choose it in such a way that it is cheaper to move forward over sideways and angular rotation because forward movement is better supported within these thin cylinders. We also implement that it is not possible to "shift gears" and move backward during the tracking. It is important to note that this does not exclude situations in which it looks like there is a "shift of gears" and a sharp angle arises. However, when this happens, it means that there is an in-place rotation, so at one location, the tracking had only spatial movement. Depending on how hard the model is punished for angular movement, we can make it more or less likely that these points arise in tracking results.

During my graduation project, we have focused on implementing only forward movement while tracking vessels, in both the left-invariant and the gauge frame. Numerically, we considered two different approaches. The first one is known by most mathematicians and is called finite differences. Most students have encountered this method at least once during their studies. As you know, this is an iterative method, which will stabilize over time (in this case). However, since it may take many iterations before the solution is stable, it can take a long time to calculate the distance from a seed (starting point) to all possible endpoints in the image. Therefore, we worked together with Jean-Marie Mirebeau (Université Paris-Sud, CNRS, Université Paris-Saclay) who is specialized in fast computing techniques. He has implemented a so-called "anisotropic fast marching" technique. This technique is similar to Dijkstra's algorithm and for specific differential equations, including the one we are solving to calculate the distances to reach each point, the shortest path can be calculated in only one pass. This method was a lot faster (20s) compared to our own (on average 10min) per simulation. We noticed that our results improved with the changes that we made to the metric and calculations, but there is still a lot to learn in this interesting area of mathematics!

0

Newton's steepest descent algorithm



PRODRIVE PUZZLE SCRABBLE

THE PUZZLE

The puzzle is to maximize the score of a single player game of Scrabble (Wordfeud)

- » Unlimited amount of letters
- » You can start everywhere, but every word after the first needs to be connected
- » Only allowed to play each unique word once
- » Boards are in 25 different sizes of (6x6, 7x7,.., 30x30), this results in $n = 6,7,..,30$
- » A triple word score tile is located on each of the tiles where the row and the column index are a multiple of 5. (e.g. 0,0; 0,5; 0,10; 5,0; 5,5; 5,10 etc)
- » The value of a letter is its index in the alphabet modulo 10 (e.g. a = 0, b = 1, c = 2, .., z = 5)
- » The list of allowed words contains both Dutch and English words and can be downloaded from the website.

SCORING

Scoring happens by grading the solution for each n and combining these in a single score.

For each of the 25 values of n , you will get a subscore between 0 and 1. The subscore is calculated by dividing the best score of any contestant for that n by your best score for that n .

Assume you are the first to submit a solution with a score of 50 for $n = 5$. Since this is the only submission for $n=5$, it is also the best raw score currently submitted for n , resulting in a subscore of 1.0 points.

Another contestant submits a solution for $n = 5$ with a score of 58. Now your subscore is reduced to 0.862 ($= 50 / 58$).

Your total score is the sum of all your subscores. This means your total score is between 0 and 25. The goal is to maximize your total score. Note that your total score is not fixed! As other people submit solutions your total score might drop, so keep an eye on the submission page.

SUBMITTING

For each word on the board you want to submit, specify the row index (0-based), column index (0-based), horizontal (H) or vertical (V), and the word.

When you place a word that extends another word, you need to play the extended word. (e.g. the tile before and after your word should be empty or non-existent)

EXAMPLE

4,2,V,PRO

4,2,V,PRODRIVE

11,0,H,AWESOME

6,6,V,ONLINE

7,4,H,CONTEST

10,5,V,AMAZING

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----|---|---|---|---|---|---|---|---|---|---|----|
| 0 | | | | | | | | | | | |
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | P | | | | | | | |
| 5 | R | | | | | | | | | | |
| 6 | | O | | | | | | O | | | |
| 7 | | | D | | C | O | N | T | E | S | T |
| 8 | | | | R | | | | L | | | |
| 9 | | | I | | | | | I | | | |
| 10 | | V | | | | A | N | | | | |
| 11 | A | W | E | S | O | M | E | | | | |
| 12 | | | | | | A | | | | | |
| 13 | | | | | | Z | | | | | |
| 14 | | | | | | I | | | | | |
| 15 | | | | | | N | | | | | |
| 16 | | | | | | G | | | | | |

Score: PRO (16) + PRODRIVE (39) + AWESOME (24) + ONLINE (23) + CONTEST (39) + AN (3 * 3) + AMAZING (3 * 3 * 24) = 366

To see the current standing, deadline and to submit your solution, go to:

<https://puzzle.prodrive-technologies.com>



HALLOUMIBURGERS

Alright, these might be the OG cheeseburgers. I mean a burger that consists of just cheese, doesn't get better than that, does it? To make this cheese-only cheeseburger we need something called Halloumi. It's a type of cheese made from cow, goat, and sheep milk. Originally just goat and sheep were used, though. These burgers are incredibly simple to make and you can easily vary with them in many ways!

TEXT Ruben Brinkman

FIRST, LET'S TALK INGREDIENTS (THIS IS ENOUGH FOR 4 BURGERS):

- » 4 burger buns
- » 450g halloumi
- » 4-5 bell peppers (if they're smallish get 5, if they're larger get 4)
- » 2 red onions
- » 1 red pepper
- » 2-3 tablespoons mayonnaise
- » 1 tablespoon of red wine vinegar
- » 1 tablespoon of oregano
- » 2 cloves of garlic
- » Some greens to put on the burger

ALRIGHT HERE'S HOW TO DO IT!

1. Start by preheating the oven to 200 degrees. Haven't got an oven or it's nice weather? Use a barbecue (even if it's not very nice weather a BBQ can be used ;))!! When using an oven, cut the bell peppers up into quarters. Put the quarters into a baking tray. Also, cut the onions into 4 pieces per onion and put them in there as well. If using the BBQ it's easier to just half the onions.

2. Put the oven tray into the oven and let it sit for roughly 30 minutes. The bell peppers should start to brown, turn the bell peppers around, and leave everything in for an additional 20 minutes. After this, the bell peppers should have some good browning and can even be almost a bit black on the outsides.

3. If you are using a BBQ just put on the bell peppers whole and roast them on each side 'til all the sides are well browned. The onions should be grilled nicely too.

4. Once the bell peppers are ready, we can start making the sauce! Put some bell peppers in either a blender or bowl in which an immersion blender can fit. You should keep around 2-3 pieces of bell pepper per burger aside. Add the onions, pepper, mayonnaise, red wine vinegar, oregano, and garlic. Blend this till you have a nice smooth sauce. Taste it and add more of the stuff you already added if you think it will make the sauce tastier.

5. Next, the halloumi! Cut the halloumi into around 3 à 4 cm thick pieces. You should be able to get around 8 pieces out of a block. Heat up some olive oil in a non-stick skillet (on medium-high) and put the halloumi in. Let it sit for a couple of minutes and once one side is brown flip it and brown the other side.

6. Assembly time! Cut open your burger buns (toast them if you like), smear on some of that nice sauce, add 2 halloumi pieces, all bell pepper, add more halloumi, add greens and top it off! There's your OG cheeseburger!

I can tell you, this thing is fire. It's incredibly easy to make as most of the work gets done in the oven. And on top of that, you get to eat soooo much cheese without any excuse. It's easy to vary around with it too! Like tomatoes? Add them! You can throw almost anything on here that you would on a normal burger. The sauce is reaaa nice with fries as well!

I really hope you'll make this one!



COMMITTEES & FRATERNITIES

GEWIS is built on top of committees. Besides, Study Association GEWIS has several fraternities which contribute to the atmosphere and organize activities.

Find out more at: www.gewis.nl/association.

FRATERNITIES

ATHENA



ATHENA

B.O.O.M.



Buitenplezier Op Onze Manier

Défi



Défi

GELIMBO



GEWIS Ervaart Limburgse

Initiatieven Met Bewondering
en Ontzag

GEPWNAGE



GEWIS Plant Weer Nerdige

Activiteiten en Geeky

Evenementen

I.V.V



In Vino Veritas



COMMITTEES

AC

Activiteiten Commissie

AVICO

Audio- en VideoCommissie

BAC

BAr Commissie

BATA

Batavierenracecommissie

C4

Corporate Communication and

Contact Committee

CBC

Computer Beheer Commissie

GEBEP

GEWIS Borrows Euler's Proofs

GSM

GEWIS Social Media

GR8-TIMES

GR8-TIMES

FESTIVITEIT

Feestdagen Extreem Smaakvol

Tevens Ietwat Verantwoordelijk

Interessante Toffe Enthousiaste

Ideeën Teweegbrengen

FYC21-0 ITAM

First Year Committee

FYC20-1 THE MEERKATS

First Year Committee

FYC21-2 THE BEER

MUSKETEERS

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FYC21-3 GELØL

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FYC21-4 ROCK

First Year Committee

FYS

First Year Support

GEBALLMERPIEK

GEWIS'sers Ervaren BALLen MET

Rigoreuze Precisie In

Excentrieke Kups

GEDWAAL

GEWIS'ers Dwalen Waar

Anderen Anders Lopen

GEFLITST

GEWIS Fotografeert Leden In

Toffe Situaties, Toch?

GEHACK

GEWIS Ervaart Het

Algoritmisch Code Kloppen

GELIFT

GEWIS'sers Liften

Ieder Fantastisch Traject

GEMOLD

GEWIS'ers moeten

overal leugens doorzien

GETAART

GEWISSers Eten TAART

GEZWEM

GEWIS Zeilt Weer Een Meter

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Ouderdagcommissie

SR

StudentenRaad

STIJL

Huisstijl Commissie

SUPREMUM

Supremumcommissie

TRAIN

Training

WC

Web Commissie

YBC20

YearBook Committee 2020

SUPREMUM

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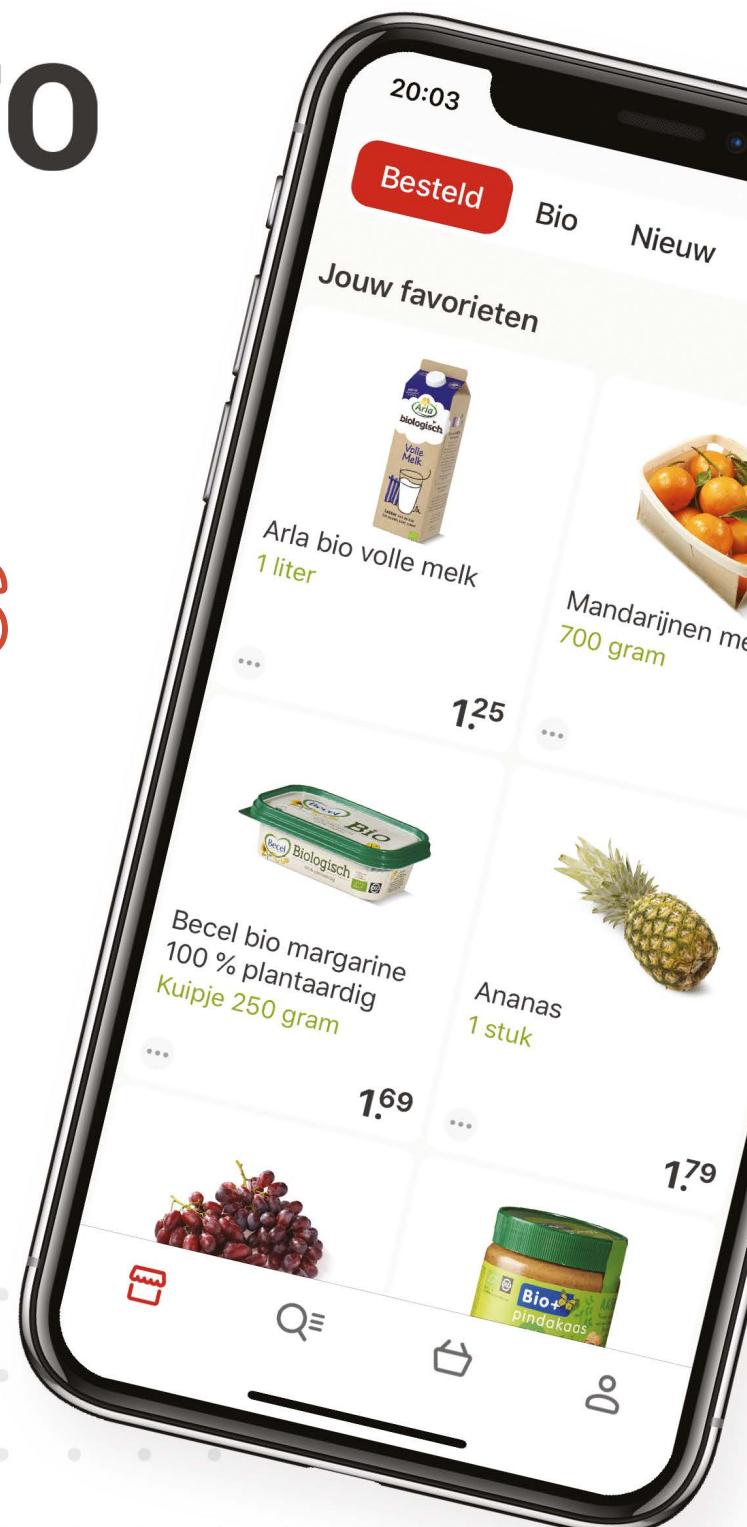
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